AVIATION WEEK

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DEC. 21, 1953

50 CENTS

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Field office personnel organize and conduct operator service training programs on new installations and new equipment — often assist in establishing maintenance and overhaul programs, and facilities.

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The continuing basic research programs conducted by stay-at-home Janitrol engineers rounds out the "team" that provides more *right answers* to aircraft heating problems. Whether your problem is heat for aircraft, ground equipment or standby needs, get Janitrol in at the design stage, and you'll get the job done quicker.

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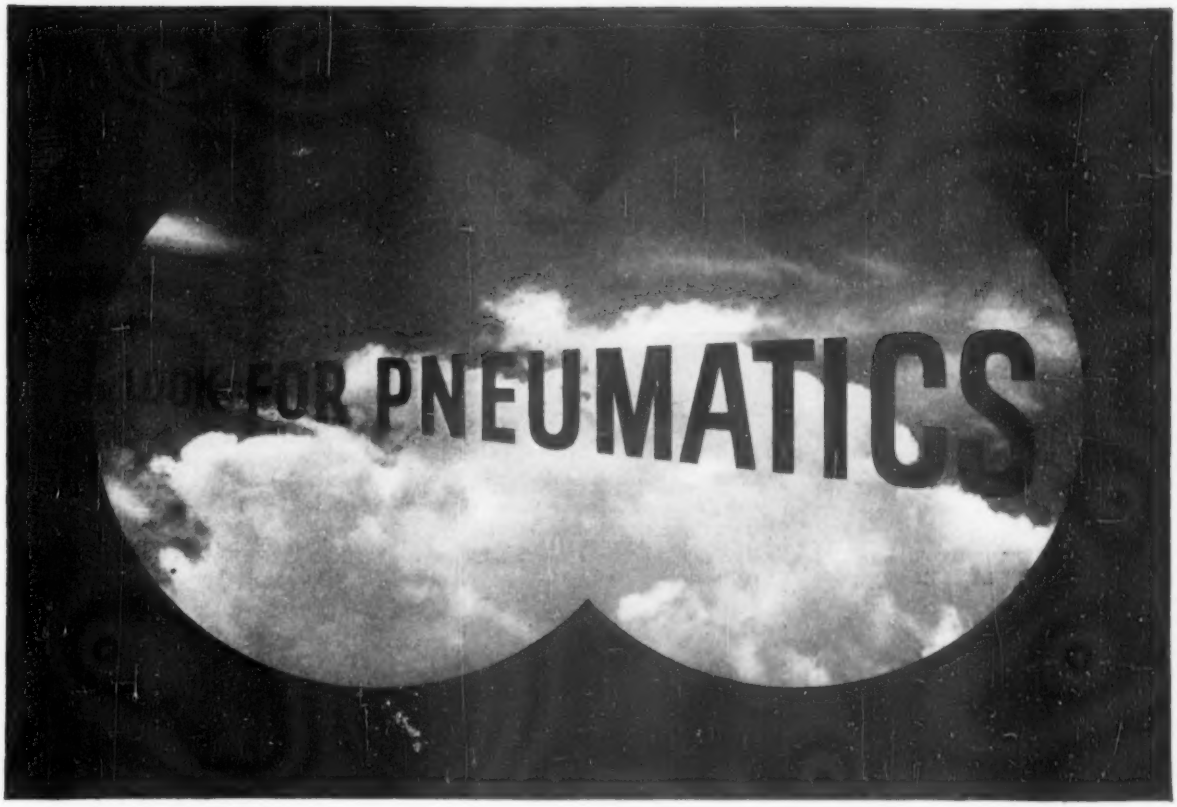

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We here at Kidde foresee a great future for pneumatics, and have been fortunate in being in on the ground floor of this fascinating field. Perhaps, like ourselves, you too are interested in this new application of a well-known energy source. If you have a problem in pneumatics write us.

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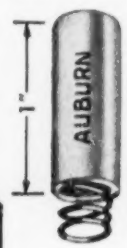

9/16" and 1" sleeves only, without springs, are also available

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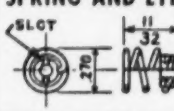

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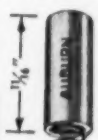

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Aviation Week

December 21, 1953 — Vol. 59, No. 25

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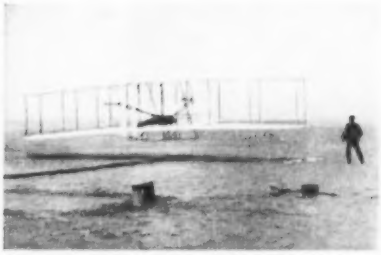
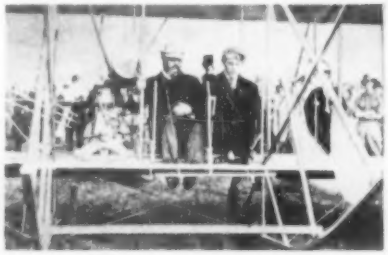
Air History in the Making

The pioneering days of aviation helped chart the course of today's great aeronautical achievements! Pictured here are some of those pioneer fliers whose genius and daring helped write the early chapters in aviation's history.

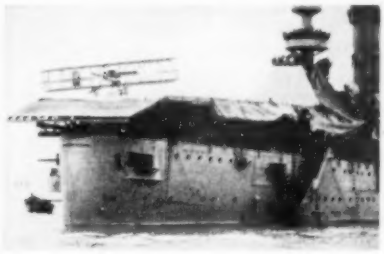


At Kitty Hawk, North Carolina, powered flight began on Dec. 17, 1903, when Orville and Wilbur Wright flew over the sand dunes for 12 seconds.

Glenn Curtiss first exploited lateral control effected by ailerons in 1908. In his pusher plane, the *June Bug*, he got off the ground at 150 feet!



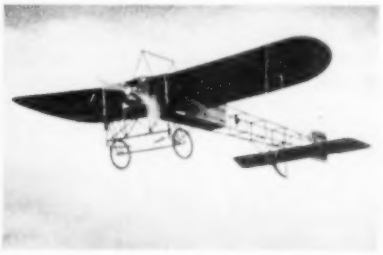
"Arch" Hoxsey, a member of the first Wright flying team, took ex-President "Teddy" Roosevelt up for a flight over St. Louis in October, 1910.



Eugene Ely made the first successful landing on a ship at sea on January 18, 1911, when he "put down" on the quarter deck of the U.S.S. Pennsylvania.

Lt. M. S. Crissy of the U. S. Army and **Phillip O. Parmalee** released the first explosive from a U. S. airplane in January 1911, near San Francisco.

Calbraith P. Rodgers became the first man to fly cross-continent when he flew from Mineola, Long Island, N. Y., to San Diego, Calif., late in 1911.



Earl Ovington, pioneer aviator, back in 1911 made the first official United States Air Mail flight from Garden City to Mineola, Long Island, N. Y.

Lincoln Beachey, aerial stunt-man and daredevil, raced his pusher plane in 1914 against auto speed demon Barney Oldfield, at fairs and expositions.

Billy Parker, in 1914, taught flying from the left hand seat of his dual control pusher plane to students qualifying for The Aero Club's pilot's license.

From aviation's earliest beginnings, high performance standards of aircraft have depended on high performance fuels.

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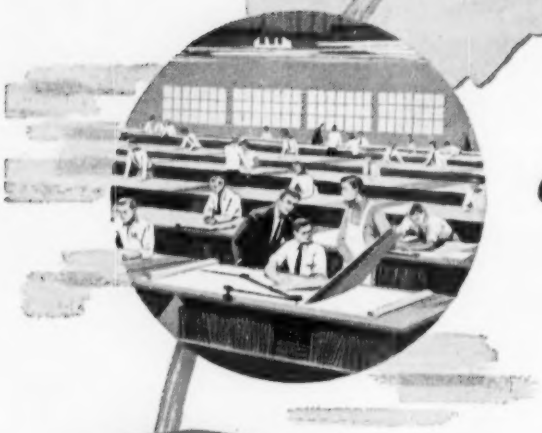
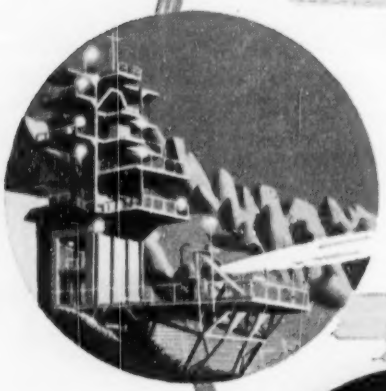
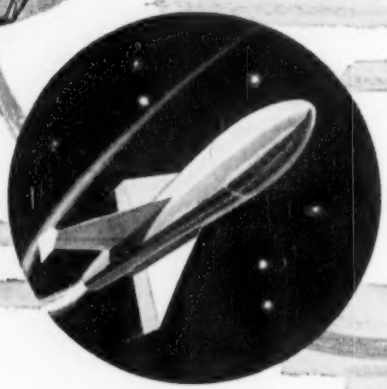


ORGANIZATION—Today North American Aviation's guided missile program is manned by more than 4800 highly skilled and imaginative scientists, engineers and craftsmen . . . many of them leaders in their particular fields . . . integrated into one of America's foremost organizations in guided missile development.



FACILITIES—Often invented to fit a specific need . . . North American's great array of technical equipment used in guided missile projects staggers the imagination. A great part of this equipment at North American's testing grounds and research facilities at Santa Susana and Downey, California is completely new and unique in American industry.



EXPERIENCE—North American began pioneering research in the guided missile field before V-J Day. The knowledge provided by North American's advanced work in miniaturization, rocket engines, fuels, automatic navigation and flight mechanisms . . . and in actual test firings . . . is helping to speed America's progress in all phases of guided missile development.

NORTH AMERICAN AVIATION, INC.

TWENTY-FIVE YEARS OF BEING AHEAD OF UP-TO-DATE

NEWS DIGEST

Rocket-Powered X-1A Reaches Mach 2.5

Maj. Charles Yeager, first man to fly faster than sound, piloted the new Bell X-1A research plane to a new unofficial speed mark of 1,650 mph. (Mach 2.5) at Edwards AFB, Calif., Dec. 16.

Yeager's flight beat the previous unofficial mark of 1,327 mph. (Mach 2.01) set by Scott Crossfield in a Douglas D-558-II Skyrocket Nov. 20 (AVIATION WEEK Nov. 30, p. 13).

The X-1A is similar to the X-1, in which Yeager cracked the sound barrier in 1947 but incorporates turbine-driven propellant pumps for its four-cylinder Reaction Motors rocket engine and has a design top speed of 1,700 mph.

Engineers Honor Dr. Durand

Dr. William F. Durand (second from left) receives a special citation "for distinguished contributions to the science and engineering of powered flight" from NACA's chairman, Dr. Jerome C. Hunsaker, during a luncheon in New York honoring engineers' achievements in aviation (Aviation Week Dec. 7, p. 7). Looking on are Brig. Gen. F. P. Lahm (USAF ret.), first Army pilot, and Adm. John H. Towers (USN ret.), one of the earliest Naval aviators.

Domestic

Local service airlines have won CAB approval of their bid to provide the Post Office cut-rate Christmas mail service at 30 cents a ton-mile from Dec. 21 to Jan. 11 on an "experimental, space-available, voluntary and non-priority basis." Regular local service mail rates range from 75 cents to $2.58 a ton-mile.

F-86K Sabre, cannon-armed version of North American Aviation's all-weather jet interceptor, soon will go into production at Italy's Fiat factory for North Atlantic Treaty Organization forces. First shipment of parts is en route to Fiat's Turin plant, will be assembled under an off-shore procurement contract calling for 50 Sabres (AVIATION WEEK Nov. 23, p. 17).

Lt. Col. George Schenkein will become chief of the Air Force section of Defense Department's Security Review Branch effective Jan. 31.

Jet propulsion fellowships totaling $36,000 will be granted next year by the Daniel and Florence Guggenheim Foundation for graduate study in rocket and jet propulsion engineering at Princeton University and the California Institute of Technology.

New ruling by the Internal Revenue Service requires airlines to collect the 3% transportation tax on property purchased for the carrier's own use and transported by it. Previously, IRS did not apply the tax to this category of property. The new ruling, effective Dec. 7, is not retroactive.

Radically new technique for making transistors, which enables them to be operated at much higher frequencies and thereby opens new avionic fields for their use, is announced by Philco. New process uses electroplating instead of more difficult laboratory-type techniques previously employed, offering the first bright prospect of mass producing transistors, Philco says.

Gen. Hoyt S. Vandenberg still is seriously ill at Walter Reed Hospital in Washington, D. C. USAF's former Chief of Staff has been in the hospital since Oct. 3. He underwent major surgery 20 months ago.

Aviation pioneers last week were honored by the Wings Club at a luncheon in New York.

Henry W. Chandler, 51, manager of programing for General Electric Co.'s Aircraft Gas Turbine Division, died this month in Cincinnati.

Financial

Beech Aircraft Corp., Wichita, predicts sales for fiscal 1954 will total more than $75 million. The aircraft builder has adjourned its Dec. 10 stockholders meeting to Feb. 25 because of "lengthy negotiations and paper work required" to settle finally the T-36 contract canceled last June by USAF (AVIATION WEEK Nov. 9, p. 7).

Northrop Aircraft, Los Angeles, reports consolidated net income of $512,315 for the first fiscal 1954 quarter ended Oct. 31, compared with $576,078 a year ago. Sales and other income totaled $40,170,894, a drop of $12,542,167 from the first three months of fiscal 1953. Backlog as of Oct. 31: $489 million, an increase of $67 million.

Seaboard & Western Airlines has declared a dividend of 30 cents per share of common stock, payable Jan. 11 to stockholders of record Dec. 18.

Fairchild Engine & Airplane Corp., Hagerstown, Md., will pay a dividend of 20 cents per share Dec. 24 to stockholders of record Dec. 14.

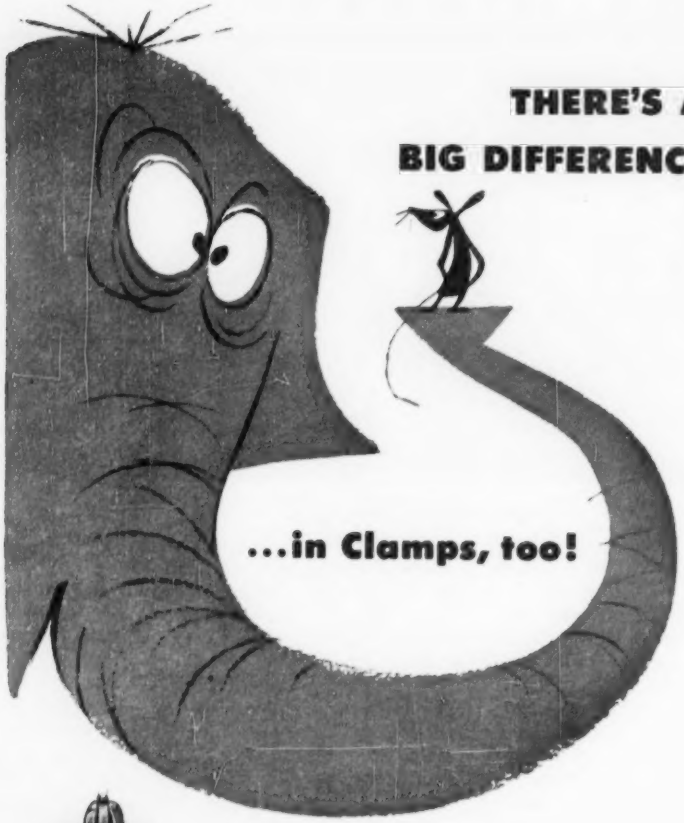
Continental Air Lines has declared a 12-and-a-half-cent dividend, payable Dec. 31 to stockholders of record Dec. 15.

Trans Caribbean Airways has declared a 5-cent dividend on Class A stock and a 5% stock payment on Class A and B shares, both payable Jan. 15 to stockholders of record Dec. 31.

International

Korean-Russian Air Transport Co. is preparing to resume operations under a new agreement signed between the Soviet Union and Korean Communists. The Red airline was formed in 1950 but suspended operations during the Korean war.

Charles Grey, founder of the Aeroplane magazine and onetime editor of Jane's All the World's Aircraft, died in London Dec. 12. He was 78.



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- **Greater spring tension.**
- **One piece construction.**
- **Safe, will not fly apart.**
- **Sturdier, last longer.**
- **Proven in 12 years use.**

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The Aviation Week

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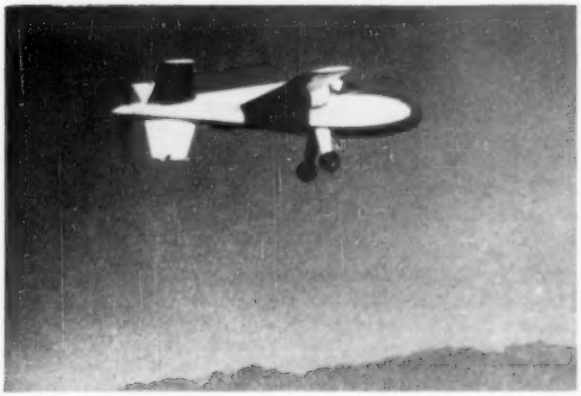
9—(top) Lockheed; (center, left) Acme Aircraft Co.; (center, right) Douglas Olson; 14—Lockheed; 28-29—Westinghouse; 41—(top) Charles E. Brown; 71—Wide World.

NEPTUNES FOR HOLLAND—Wearing Royal Dutch Navy markings, Lockheed P2V-5 Neptune with elongated tail carrying electronic sub detection devices leaves Burbank, Calif., following delivery ceremonies. U. S., French, British and Australians also operate P2Vs.

Aviation Developments in the News



JR. MIXMASTER—Acme Aircraft Co., Torrance Municipal Airport, Calif., plans to use this single-place pusher racer built by Sierra Aviation Co., Los Angeles, as a testbed for a two-place, cross-country plane or four-place, twin-engine, high-performance pusher. Craft has 85-hp. Continental. (Also see Aviation Week Oct. 26, p. 21).

NEW WING TESTED—Rebuilt Taylorcraft embodies a 12-ft.-span wing with approximately 3-ft. chord fitted with spoilers and full-span flaps. Builder Merle Larson, Oakland, Calif., believes this will provide higher speeds in addition to other efficiencies over conventional designs. The plane is undergoing flight trials.

JET COPTER NEARS TESTS—First photo of 100-lb. ramjet-powered copter designed and built by Bensen Aircraft Corp., Raleigh, N. C. The Mid-Jet is designed to lift four times its own weight and attain 80 mph. Famed aerobatic pilot Betty Skelton is seen checking the Bensen Mid-Jet, which is expected to be entered in the Navy's forthcoming design competition for small helicopters.

Ask the men with the most experience...

ask John B. Rintoul

Chief Pilot, E. R. Squibb & Sons, Division of Mathieson Chemical Corp., New York City

"**In 12,000 hours** of flying, I've learned to look first for consistent, country-wide quality in aviation products," says Mr. Rintoul.

"The Squibb Company's DC-3 has a busy schedule, covering the United States, Cuba, Mexico and Canada. So you can appreciate how fussy we are about smooth, safe performance and efficient maintenance.

"That's why, for the last seven years, we've been a steady user of Gulf Aviation Products."

Chief Pilot Rintoul with the DC-3 owned by E. R. Squibb & Sons, a leading manufacturer of pharmaceutical products.

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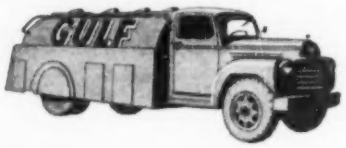
Gulf Aircraft Engine Oil, Series-R, is a top-quality, non-detergent, straight mineral lubricating oil—approved by Pratt & Whitney and other radial engine manufacturers for all types of service. It retards sludge and carbon formation and retains its body at high operating temperatures.

For horizontally opposed and Ranger in-line engines

Gulfpride Aviation Oil, Series-D, is the world's finest detergent-dispersant aviation oil. It minimizes ring- and valve-sticking, oil consumption, oil-screen clogging and plug-fouling. Users of this great oil have actually increased periods between engine overhauls by as much as 100%.



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WHO'S WHERE

In the Front Office

Harold W. Sweatt, longtime president of Minneapolis-Honeywell Regulator Co., has been elected board chairman, succeeding **Mark C. Honeywell,** who is new honorary chairman. **Paul B. Wishart,** former vice president and general manager, succeeds Sweatt as president. New directors: **Tom McDonald,** vice president-sales, and **A. M. Wilson,** vice president in charge of the Aeronautical Division.

C. R. Smith, president of American Airlines, is a new director of Chase National Bank, New York.

Edgar D. Leon has been elected president and a director of Gear Grinding Machine Co., Detroit.

Gwin Hicks is new special assistant to the president of Lake Central Airlines.

Changes

John Drollinger, Jr., has been promoted to manager of Reliance Electric & Engineering Co.'s Renewal Parts and Repair Division, Cleveland. Other changes: **Paul W. Arnold,** manager of marketing service; **Charles R. Sutherland,** assistant chief engineer.

I. F. Richardson, Jr., has been appointed assistant general manager of Bendix Aviation Corp.'s Kansas City Division.

D. W. Brown has become manager of project engineering in Goodyear Aircraft Corp.'s Piloted Aircraft Engineering Division, Akron. **S. J. Pipitone** is new manager of airframe installations design.

Harold T. Hokanson has been promoted to project manager of General Electric Co.'s small aircraft engine department of the Aircraft Gas Turbine Division at Lynn, Mass., taking charge of development of a helicopter turboprop powerplant. Other GE changes: **E. Willard Winslow,** manager of advertising and sales promotion of the silicone products department's marketing section, Waterford, N. Y.; **W. C. O'Connell,** general manager of the aircraft accessory turbine department, Lynn, Mass., and **William G. Williams,** technical engineer in the Aircraft Gas Turbine Division's analysis section, Cincinnati.

J. C. Owen has become chief engineer-instrument products of Lear's Grand Rapids (Mich.) Division.

John H. Carter, former USAF guided missiles expert, is new assistant director of development planning at Lockheed Aircraft Corp., Burbank, Calif.

H. Hunter Gehlbach has been elected assistant secretary of Borg-Warner Corp., Chicago.

Edgar E. Clark has joined Pacific Scientific Co., San Francisco, as assistant secretary.

Honors and Elections

J. H. Kindelberger, president of North American Aviation; **William Lear,** chairman of Lear, Inc., and **Robert Prescott,** president of Flying Tiger Line, will receive Minute Magazine's annual business achievement award for contribution to development of Southern California industry.

INDUSTRY OBSERVER

► USAF has thrown a security blanket over the flight, but a North American F-100 Super Sabre recently hit Mach 1.38 during a test flight at 35,000 ft. altitude. At standard temperature of −67F for that altitude the Super Sabre's speed was 913 mph. This flight was not part of an official attempt at a new all-altitude speed record although North American will try for this record soon.

► Douglas and North American are planning to carry their international record rivalry between the F-100 and F4D into a new category—climb for altitude. There are no U. S. national records for jet rate of climb to various altitudes. International records were set in 1951 by a special British Meteor fighter powered by two Sapphire turbojets as follows: to 9,842 ft.—1 min. 15 sec.; to 19,685 ft.—1 min. 50 sec.; to 29,527 ft.—2 min. 27 sec.; and to 39,370 ft.—3 min. 9 sec.

► Main reason British European Airways plans to operate turboprop Viscounts over its 500-mi. trunkline routes inside the United Kingdom is the high tax on aviation gasoline. Kerosene fuel used by the Viscount costs 26 cents a gallon, including tax, while the government tax on aviation gasoline used by the competitive de Havilland Elizabethan transports is 30 cents a gallon. Except for the tax, the Elizabethans would be more economical than the Viscount on U. K. internal services.

► Second Convair YF-102 delta-wing all-weather interceptor was rushed to Edwards AFB last week for renewal of the flight test program interrupted (Aviation Week Nov. 9, p. 18) by the crash of the original prototype. Convair reports the second F-102 was completed ahead of schedule. Engine tests with the P&WA J57 turbojet were conducted with the second plane in San Diego to expedite the flight test program at Edwards AFB.

► Air Line Pilots Assn. is considering a change in its landing aids policy to designate GCA as a primary aid instead of simply a monitor for ILS. Motive behind the proposed switch is to get lower weather minimums at fields that have GCA but not ILS. Minimums cannot be lowered unless pilots recognize GCA as a primary landing aid.

► Pentagon sources discount newspaper reports that U. S. plans to buy British guided missiles with off-shore procurement funds. Last year's budget carried $100 million for off-shore missile procurement but there are no British missiles close enough to production or operational reliability to warrant purchase.

► USAF is negotiating with Reaction Motors, Inc., to supply a rocket motor for the Bell X-2 as a possible substitute for the Curtiss-Wright 12,000-lb.-thrust rocket originally scheduled for the X-2. Negotiations with RMI may be an indication that the Curtiss rocket still may be a long way from operational use.

► Westinghouse is trying to interest the Navy in sponsoring development of a new high-powered turbojet utilizing Rolls-Royce technical assistance. Rolls already has shipped several 9,500-lb.-thrust R.A. 14 Avon turbojets to Westinghouse under terms of their technical interchange agreement and Westinghouse has a license to build the R.A. 14. Westinghouse sources say, however, that the R.A. 14 will not be manufactured in the U. S., that efforts will be concentrated on pushing the new engine proposals.

► Fairchild Engine & Airplane Co. planned to use 1,400 lb. of titanium in late production versions of its C-119 cargo transport but USAF refused to grant an allocation of the relatively scarce metal. USAF did not object to Douglas Aircraft's use of titanium in its commercial DC-7 airliner because the pure titanium used by the aircraft manufacturer is not in such short supply as titanium alloys.

► Canadian Avro's CF-100 all-weather fighter is now in service with three squadrons of the Royal Canadian Air Force with six more CF-100-equipped squadrons planned.

Washington Roundup

Deputy for Fred Lee

Commerce Department officials are looking over the field for a tough, knowledgeable Republican to appoint as deputy to Fred B. Lee, Civil Aeronautics Administrator. The Deputy Administrator's post has been open since it was vacated by Lee to move into CAA's top spot. Job was removed recently from Civil Service status for political appointment. Commerce Department feeling is that Lee needs a deputy to stiffen CAA reorganization policies.

CAB-Post Office Parleys

Post Office-Civil Aeronautics Board talks are minimizing friction developing from P.O. decision to ship via the airline route with the lowest mail rate. If this diverts mail from a subsidy airline, it increases the CAB budget as much as it cuts the P.O. budget. CAB claims that this would increase total cost to the government because of failure to utilize available subsidy-supported capacity.

Post Office may continue shipment on such services as subsidized Northeast Airlines vs. American and Eastern Air Lines on the New York-Boston route; subsidized Pan American and TWA vs. Seaboard & Western on trans-Atlantic military personnel mail (considered airfreight by Post Office).

Expenditure Throttle

Watch for the Eisenhower Administration to bring strong pressure on government agencies to hold down expenditures (actual cash outlays) during the rest of fiscal 1954 in an attempt to stay below the public debt limitation.

Sen. Homer Ferguson, key Republican congressional leader on fiscal policies, predicts that the Administration will hold down expenditures adequately but warns that Congress will step in if federal spending appears to get out of hand again. Republican expenditure policy will mean that Defense Department will continue to be tough on making progress payments to defense contractors.

Route Competition

Civil Aeronautics Board members are exploring possibilities that legally would authorize them to study and evaluate the entire domestic airline competitive route structure before deciding each of the individual area route cases now on the CAB docket. Board feels the individual cases are so closely related to the entire route structure that they should be evaluated as an entity rather than as separate cases as the law now demands.

Examples of current cases on which Board members informally are trading ideas on long-range competitive impact are the United Air Lines Chicago-Seattle restriction, Eastern Air Lines southern service to the West and the New York-Chicago, Denver service and northeast-southwest service cases.

ANDB Reorganization Progress

Reorganization of the Air Navigation Development Board is expected within a few weeks (AVIATION WEEK Nov. 9, p. 108). Fiscal 1955 budget requests already allocate funds from among the supporting agencies (Army, Navy, Air Force and Commerce) rather than Commerce alone. Designation of policy-level representatives to head the interagency board is the next step.

Missile Group Fades

Guided Missiles Institute that recently attempted to organize a trade association for missile manufacturers (AVIATION WEEK Nov. 2, p. 15) apparently has faded from the Washington scene. Second organizational meeting scheduled for Dec. 1 at the Mayflower Hotel never was held and aircraft firms report correspondence from the institute to prospective members has stopped.

Airlines Studies Out Soon

Watch for the first public appearance soon of results of the Commerce Department studies on airline subsidies, routes and competition. They have been under way since midsummer.

U.S.-Canadian Talks

Formal discussion between U.S. and Canadian air transport officials have begun on an amicable note and have been devoted mostly to clearing up routine problems of border operations. For example, Trans-Canada Air Lines serves the Canadian city of Sault Ste. Marie through an airport on the U.S. side of the border without any formal authority.

Recent talks formalized TCA's authority to continue this practice. The controversy over Tampa-Mexico service has been resolved in favor of the U.S. position (AVIATION WEEK Nov. 23 p. 18).

New Information Policy

Fred Seaton, Nebraska publisher and former U.S. Senator, who now is Assistant Secretary of Defense for Legislative Affairs and Public Affairs, plans to make some positive changes in Defense Department information policies.

"I came to Washington to open doors, not close them," Seaton told AVIATION WEEK. Among the Seaton-sponsored changes will be more frequent press conferences by top defense officials. Seaton recently named Herschel Schooley, veteran Pentagon press handler, as his No. 2 man for public relations with the title of Director of Office of Public Information.

MATS Reorganization

Pentagon's proposed reorganization of Military Air Transport Service is getting close to the Dec. 31 deadline promised Congress by W. J. McNeil and H. Lee White, Defense Department and USAF fiscal experts, respectively.

Meanwhile, the reorganization plan itself has been obscured by a USAF security classification of the military airlift while the Air Council debates the merits of shifting USAF to an aerial logistics system.

If Air Council favors the aerial logistics system, total volume of military airlift will increase substantially. Airline attitude on the MATS reorganization is awaiting USAF decision on the logistics system and plans for airline contract operations as part of the military airlift.

—Washington staff

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Outlook for Fiscal 1955:

Air Power Regains Arms Buildup Priority

- **Budget proposal and three-year defense plan submitted to White House reflect switch in military policy.**
- **Balanced-force concept out; Army and Navy to be cut gradually during remainder of Eisenhower term.**

By Robert Hotz

Air power will be the keystone of United States military planning for the next three years. This is the significance of the fiscal 1955 Defense Department budget estimates submitted last week to the White House along with a military program to cover the remaining years of President Eisenhower's tenure.

Here is what is in prospect as a result of the budget proposals and the three-year military plan:

• **Air power will continue** a gradual buildup. This includes both USAF and Navy air power.

• **Surface Navy and ground Army** will be reduced gradually.

The new Republican military policy represents a complete reversal of the early attitude of the Eisenhower Administration that resulted in slashing $6 billion from both USAF and Navy air power in the fiscal 1954 budget and a basic change in attitude toward air power of Defense Secretary Charles E. Wilson and his chief aide, Roger Kyes (AVIATION WEEK Dec. 7, p. 9).

This change also is reflected in U. S.-dominated military planning for NATO which last week recommended a 1,200-plane increase in European-based air forces to boost total NATO air power from its current level of about 4,400 aircraft to 5,600 planes by the end of 1954.

▶ **Major Victory**—The emphasis on air power also represents a victory for the civilian authority of President Eisenhower, the National Security Council and the Secretary of Defense over the purely military approach of the Joint Chiefs of Staff. The JCS fiscal 1955 budget proposal was a traditional three-way split of the budget, giving each service what it wanted, to the tune of a $43-billion total. The new fiscal 1955 military budget will emerge near the $32-billion mark in contrast to $34.5 billion approved by Congress for fiscal 1954.

It will provide for:

• **Increase of USAF** from the 120-wing interim level set for fiscal 1954 to 127 wings during fiscal 1955 and 137 wings during fiscal 1957. The 137-wing total is just six wings short of the original 143-wing USAF expansion goal set after the outbreak of war in Korea.

• **Emphasis on modernization** of Naval air power both in aircraft and aircraft carriers and particularly expansion of anti-submarine warfare aviation units.

• **Reduction in the fiscal 1955 budget** will be made by reducing the number of men in the Army and surface Navy and by cutting operations of Navy ships not directly related to the carrier task force and anti-submarine warfare missions.

▶ **Answers Democrats**—The defense budget is not expected to encounter serious opposition in the next session of Congress since its primary emphasis on air power answers the main argument of the Democrats in principle, although differing with them in degree. The reduction in the total defense budget is likely to get solid support from Republicans and conservative Democrats.

Ironically, the return to primary emphasis on air power and the rejection of the "balanced force" concept of dividing the defense dollar evenly between the three services continues a policy initiated during the Democratic Administration with the fiscal 1953 budget.

With the current temper of Republican military thinking it appears unlikely that the financially-balanced force concept will return during the next three years.

▶ **Continental Defense**—For the Air Force, the fiscal 1955 budget will provide continued increases in total combat forces and modernization of equipment. Emphasis will be on strengthening the air defense of the North American continent and converting the long-range striking power of the Strategic Air Command to jet-propelled equipment.

Difference between the current 137-wing goal and the original 143-wing expansion program will be at the expense of troop carrier transport wings.

Indication of the trend in Naval air power is seen in the continued emphasis on the heavy carrier striking force employing atomic weapons, and a switch in anti-submarine warfare operations that calls for conversion of 10 Essex-class 27,000-ton carriers for ASW. The Essex-class carriers were the largest employed in World War II and currently are dwarfed only by the three Midway-class postwar attack carriers.

Earlier Navy planning utilized only the small "jeep" carriers built during World War II for anti-submarine warfare.

Switch to the larger carriers for ASW involves the following advantages:

• **Increased speed** of the larger attack carriers.

• **Ability of larger carriers** to service, house and launch a larger number of ASW aircraft.

• **More maintenance shop space** available. The complex electronic gear required for ASW necessitates extensive maintenance and repair facilities if both the carrier and its aircraft are to remain effective during long sea patrols.

The "jeep" carriers are to be assigned to the Marine Corps for use in helicopter airborne assaults. This will be the first time Navy carriers will be assigned for Marine operations although Marine air groups have operated from Navy carriers.

▶ **Shift in Emphasis**—Additional use of air power is seen in the Army's trend toward smaller but more mobile combat forces relying for increased mobility on air transport of both manpower and weapons.

The three-year military plan is based on a shift in emphasis from rapid buildup to meet a specific crisis to a sustained military effort over a period of years to meet the twin possibility of a major enemy attack or a localized conflict similar to the Korean war.

Adm. Arthur W. Radford, chairman of the JCS, indicated that future Pentagon planning would be conducted in specific three-to-four-year periods within the framework of a basic long-range military plan. This encompasses an evolution toward newer types of weapons based on the combination of air power and atomic and nuclear weapons.

Study Favors One Regulatory Body

Temple survey proposes abolishing CAB, transforming CAA into a bureau within overall commerce agency.

First indications of the course the Administration may follow in reorganizing government agencies handling aviation matters are included in a survey made under the direction of Dr. Robert L. Johnson, president of Temple University.

The survey does not have official status, but the Administration participated in its development. Shortly after the 1952 election, President Eisenhower appointed Nelson Rockefeller, now Undersecretary of the Department of Health, Education and Welfare; Arthur Flemming, now director of the Office of Defense Mobilization, and Milton Eisenhower, president of Pennsylvania State University, to represent him in the undertaking.

Johnson participated in the 1949 review by the Hoover Commission and since then has headed the Citizens Committee for the Hoover Report, aimed at putting the commission's findings into effect.

The Temple University survey makes these proposals, some flatly and some tentatively, recommending further study:

• **Abolish Civil Aeronautics Board** and create one independent regulatory body for transportation.

• **Establish a review board** to review the merit of decisions by CAB and other regulatory agencies.

• **Realign Commerce Department** into two primary divisions: A - "Federal Transportation Services," directed by the Undersecretary of Commerce for Transportation and including all non-regulatory government transportation functions and a "Federal Business Services."

• **Transform Civil Aeronautics Administration** into a "Bureau of Civil Aviation" within the Federal Transportation Services and transfer to it the promulgation of air safety rules, but with the right of review by the board.

• **Require subsidies to air carriers** to be voted specifically by Congress. (The legality of Congress refusing subsidies awarded by CAB is questionable.)

• **Put National Advisory Committee for Aeronautics** either in the Federal Transportation Services of Commerce Department or in the Air Force, if it is decided NACA's functions primarily are military.

• **Restrict Budget Bureau** from considering and vetoing individual budget items, leaving this to the department concerned. Budget Bureau would concentrate on matters such as overall expenditure ceilings and management organization to promote economy.

• **National Security Council's** statutory recognition should be eliminated and, as a renamed "National Policy Council" headed by a full-time chairman of top stature, it should be a direct advisory arm of the President. In addition to top government officials, private citizens should serve as members.

The Temple survey reiterates some of the Hoover Commission recommendations that have not yet been put into effect, such as the realignment of Commerce Department.

Establishment of an Undersecretary for Transportation follows one of the Hoover recommendations. But some of the survey's proposals, such as the single regulatory agency, are new. The Hoover Commission rejected this plan.

▶ **Judge and Jury**—The regulatory agencies, such as CAB, are singled out for criticism on the ground that they function as "administrator, prosecutor, judge, and jury" and make decisions affecting the economic future, not only of industries, but of the nation.

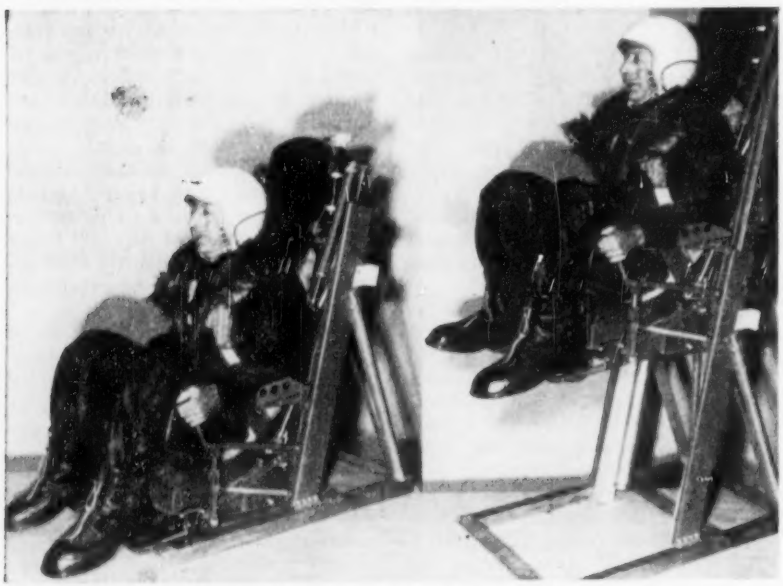
On the one hand, they make decisions under standards that are broad and vague, such as "just and reasonable rates" and "in accordance with the public interest," the survey comments.

On the other hand, "the agencies . . . make . . . judicial determinations as to whether or not their own rules and regulations have been violated and even to ferret out and prosecute the violators."

▶ **Review Power**—Since regulatory agencies, unlike courts, do not make decisions on past "facts" but charter the future economic course, the survey maintains, their decisions should be subject to review for "wisdom," as well as to court test for legality. An "Agency Board of Review" was proposed to do this. It was suggested that membership of the House and Senate committees might be represented on the board in the consideration of cases of particular concern to them.

To preclude the review board from becoming an instrument "to create additional technical delays," the board would decide what cases to consider.

Objections to the tendency of CAB and other agencies to "retry" cases heard by examiners were made. To speed up actions, it was advocated the exam-



Lockheed Shows New Ejection Seat

Action of telescoping rails that precisely guide Lockheed Aircraft Corp.'s new automatic ejection seat out of a jet fighter is demonstrated in this photo sequence. Picture at left shows the Lockheed-developed seat in normal position, with occupant raising the handgrips to arm the firing mechanism preparatory to ejection. Squeezing a lever fires the propellent, sending the seat shooting upward out of the cockpit. Photo at right depicts the seat with telescoping rails locked approximately two feet above the stationary portion of the track. Rails guide the seat well above the cockpit rim and provide a straight trajectory for clearing the airplane. First production models of this seat are going into Lockheed's F-94C USAF all-weather interceptor.

iners be considered as the "trial court" and the board as the "appellate court."

Establishment of a single regulatory agency should proceed with caution after further careful study, the survey said.

"We must determine carefully to what extent integrated regulation is possible and practicable," it warns, "consistent with such particular protections as the one or the other form of transportation may require."

ATA Elects Johnson As New President

Undersecretary of the Army Earl D. Johnson is new president of the Air Transport Assn. (AVIATION WEEK Dec. 7, p. 9). He was elected last week by ATA's board of directors.

President Eisenhower has accepted Johnson's resignation, and he will assume his new duties Jan. 1. Johnson replaces Vice Adm. Emory S. Land, eight-year ATA president who has resigned effective Dec. 31.

Johnson served as an Air Force pilot in World War II, and during the last months was deputy commander of the Air Transport Command's Ferrying Division. In civilian life, he worked for a firm of investment counselors.

Westinghouse Hires Jet Consultants

Westinghouse Electric Corp. has engaged Sanderson & Porter, New York engineers, as consultant to the Aviation Gas Turbine Division on development and production of jet engines. The agreement is scheduled to run for an indefinite time.

P. B. Taylor and S. T. Robinson, of S&P, will represent their company with the Aviation Gas Turbine Division, but will report directly to Westinghouse president Gwilym A. Price. Other members of their organization will be available as needed.

CAA Abolishes OADR. Trims Paper Work

Civil Aeronautics Administration has made two new minor moves in its current economy wave (AVIATION WEEK Nov. 16, p. 14). It abolished:

- Office of Aviation Defense Requirements.
- 140 internal administrative reports.

OADR functions (processing civil aircraft priorities) have been transferred to the Office of General Services.

CAA drastically reduced the number of its internal reports as a result of a detailed study of all CAA reports and reporting procedures.

LEONARD S. HOBBS and J57.

Leonard Hobbs Wins Collier Award for J57

Leonard S. Hobbs, vice president-engineering of Pratt & Whitney Aircraft Division, is recipient of the Collier Trophy for 1953 in recognition of his work in developing the 10,000-lb.-thrust-class P&WA J57 split-compressor turbojet.

He received a miniature of the trophy from President Eisenhower at the Aero Club of Washington's dinner on Dec. 17, which also commemorated the 50th anniversary of powered flight.

The P&WA executive engineer pays tribute to the late Andrew Wilgoos, who headed early J57 research, to Wilgoos' successor, Wright Parkins, and 1,500 engineers of the company who have contributed to the program.

Hobbs, 57, joined Pratt & Whitney Aircraft as research engineer in 1927 after leaving Stromberg Carburetor Co. where he developed a carburetor that would work during inverted flight. Previously, he had been a civilian experimental engineer with the Army Air Corps. In 1939 he became director of engineering for P&WA and a member of the board of United Aircraft Corp., its parent organization, in 1942. He was appointed to his present post in 1944.

$1-Million Credit

(McGraw-Hill World News)

Havana—Cia Cubana de Aviacion is getting $1 million in credit from the Cuban government to purchase new equipment, build a machine shop and provide working capital.

Half the amount will be in the form of a one-year loan; the remainder will be invested by the government's Agricultural and Industrial Development Bank in 6% accumulative preferred stock of the airline.

PAA-NWA Merger Rumored, Denied

Talk of a merger between Pan American World Airways and Northwest Orient Airlines continues to be heard, despite denials by both carriers that such a move is contemplated.

Source of the merger speculation is charged to two current federal actions:

- **Civil Aeronautics Board** hearings on renewal of the carriers' competitive Pacific routes and on Transocean Air Lines' application for a mid-Pacific route certificate.
- **Administration** quest for ways to cut the airline industry's $80-million annual subsidy need.

▶ **Pro and Con**—Merger proponents within the government assert the merger would:

- **Cut subsidies** by several million dollars annually.
- **Eliminate artificial route restrictions** designed to protect each carrier from the other's competition but, in effect, crimping service of both.
- **Give Pan American** the long-sought transcontinental link to complete its round-the-world route pattern and shorter, Great Circle route across the Pacific.
- **Give Northwest routes** much-needed modern equipment and capital.

A PAA-Northwest merger agreement would have to go to the President for approval, after Civil Aeronautics Board hearings and recommendation.

Washington observers note that, although such a merger of industry giants might make the Administration vulnerable to anti-monopoly political criticism, the problem could not arise until after next November's congressional elections because of the required time lapse for CAB procedural steps.

▶ **Another View**—Opponents of the Pan American-NWA merger idea argue that indirectly, the benefits from cost-cutting competition between the two companies outweigh the more apparent direct cost increase through duplication and distortion of route patterns.

They also say improvement of route patterns is the main purpose of the current trans-Pacific route case at CAB, and that proper Board and Presidential decision on these renewals and amendments can lower their cost without resorting to the more drastic cure of merger.

Ultimately, they conclude, Orient trade will increase enough to support the competitive trans-Pacific operation, and that CAB and the President now must decide the Pacific route pattern with that long-range viewpoint.

Carriers Blast Airways User Toll

Three air transport groups call proposed charge excessive, forecast it will slash net profits by 36.5%.

By Richard Balentine

Air transport industry last week reacted with strong opposition to Civil Aeronautics Administration's federal airways user charges program (AVIATION WEEK Nov. 2, p. 71).

Objections came from:

• **Air Transport Assn.** which warned that the industry "should not be used as an experimental guinea pig in the problem of charging for services furnished by the federal government to various forms of transportation."

• **Independent Military Air Transport Assn.**, which charged that the CAA proposal is "excessive, inequitable and inconsistent with sound public policy."

• **Transport Air Group,** which claimed "the development nature of the air-freight and airlift of the industry has not been fully recognized in the decision to assess user charges in such a wholesale fashion."

The rebuttals were made in response to CAA's request for comment on the proposed levies.

Milton W. Arnold, chairman of ATA's user charges committee, made these points in a letter to CAA Administrator Fred B. Lee:

• Commerce Department should apply equitable user charges to all modes of transportation and not single out air transport.

• The military should bear directly its share of the burden of supporting the federal airways system.

• Military standby value of 30% of annual cost of the airways system should be allocated before any charges are made on the basis of use.

• Use of "value of the service" in the allocation of costs is an incorrect application of a pricing principle in this instance.

• Present paid gasoline taxes must be considered as user charge payments.

"These principles are so essential to the provision of a fair and equitable system of airways user charges," wrote Arnold, "that if CAA does not see fit to make the rquested changes, the scheduled airline industry will have to oppose payment of any amount of user charges above the present 2-cent gasoline tax until these matters can be rectified."

The user charge program, as tentatively proposed by CAA, would slash at least 20% off domestic trunk airlines annual net profits. CAA has proposed that a fee of 2½ cents a gallon on aviation fuel consumed in domestic civil operation be levied. This would be effective July 1, provided the President and Congress go along with the idea. It would be added to the present federal 2-cent aviation gas tax.

▶ **Least Spent**—In expanding its rebuttal points, ATA says the present proposal for airways user charges "unfairly singles out the youngest important transportation system, the one on which the least federal funds are spent and the system to which the federal government has been contributing for the shortest length of time."

Last year federal expenditures on airways facilities amounted to $90,360,000 —$65.5 million for operation and maintenance of airways and $24,860,000 for construction and development, or approximately one-fifth of the total amount spent on each of the other means of transportation.

ATA says $569,940,000 was spent on highways and $440 million for waterways. Another aspect, it is pointed out, is that the number of years over which substantial federal expenditures have been made for aviation is much smaller than for either of the other means of transportation.

▶ **Reduces Profits**—The $38.4 million purported in the CAA draft study to be the proper allocation of the scheduled airlines would result in a reduction in net profits of 36.5%. There would be a like reduction in federal government revenues through corporate income taxes paid by the carriers.

Another point, says ATA, is that more than one-third of the total net profits of the entire domestic scheduled industry would be taken away by user charges.

"The proposal of such charges deliberately thwarts a long-standing government policy, that of the development of an efficient system of air transportation," according to ATA.

▶ **Recent Policy**—The association also points to a recent informal policy statement by Charles F. Willis, White House staff member in charge of liaison with the Air Coordinating Committee on the air transport industry:

"This Administration believes in a safe, privately owned, competitive, progressive and, as soon as possible, self-supporting air transportation industry, large enough to extend the benefits of aviation at low cost to all the American people, big enough to expand world trade and contribute to world peace, and strong enough to form a ready reserve for military airlift in event of war. Our air transportation system should be both a sword and a plowshare."

▶ **Standby Value**—On the point of military use of the federal airways, ATA says the CAA draft study errs in accepting the position of other studies that no cost allowance can be made for military standby value.

The association says 30% is a very conservative allowance for military standby value because:

• **Federal airways system** is a military operational necessity. Minimum value to the military would be the cost of constructing a similar system if the present airways system did not exist.

• **Six of the eight members** of the Air Coordinating Committee, which makes basic decisions about the kind of facilities and services that will be available

Longer Runway for Thunderstreak Tests

First photo of recently completed 3,000-ft. runway extension (bracketed within dashed lines) which lengthens airstrip at Republic Aviation Corp.'s, Farmingdale, N. Y., factory to 7,500 ft. The extension, built under an Air Force facilities contract, will aid flight operations of F-84F sweptwing jet fighters and provide additional safety for pilots and nearby residents. The enlarged airstrip can handle day-and-night operations.

to any user, are military representatives.

• **Military operational requirements** many times necessitate service priorities not received by any other user. The military instantaneously can commandeer the entire federal airways system in case of emergency.

• **Military traffic** is one-third of the total on the airways system.

• **The airways system** is geared into the total continental defense system and constitutes an integral part of that system in instant readiness for use.

ATA also is balking at CAA's proposal to apply the "gross-ton-miles-flown formula" to the airlines and other civil aviation but not to military airways users. This results in the "unfair and wrong allocation to the airlines of far more than the share of costs for which they are responsible and in allocating to the military far less than their fair share," the association says.

ATA disagrees with the fact that presently paid gasoline taxes would not be considered as part of the user charge payment and that the military would make no contribution and would report nothing.

It reasons that including the military in the financial support of the airways by the users is necessary to indicate the total amount the users are contributing to the cost of the system at certain rates. And it would determine what rates of charge would be necessary to recover given levels of airways cost.

Airlines alone will pay about $15 million in engine fuel and oil taxes in 1953. As fleets grow and operations increase such taxes will rise annually at about $2 million a year. Thus CAA must recognize the aviation gas tax as a user charge, says ATA. Since excise taxes are applied presently only to airways and highway vehicles, these taxes are user charges—otherwise all users of gasoline and diesel fuel would pay them, the airlines figure.

▶ **IMATA Criticism**—Ramsay D. Potts, Jr., president of IMATA, wrote Administrator Lee: "It must be appreciated that aviation is the newest of the forms of transportation and that public facilities are used in other fields of transportation.

Potts also pointed out that "the vast bulk of the services performed by IMATA members are for the military services, either in the CAM operation (domestic official plane load movements of military personnel) or in such activities as the Korean airlift."

L. R. Hackney, executive vice president of TAG, wrote CAA: "The military standby aspects of the federal airways system cannot, in the opinion of the Transport Air Group, be ignored because the military requirements are, in many respects, the overriding technical and cost consideration in the common civil-military airways system."

U.S. Jet Liners

- **Seminar finds turbine safety needs more study.**
- **Awards cite outstanding achievements for 1953.**

San Bernardino, Calif—Aviation industry representatives took a long look at commercial jet transports last week and concluded that more work is needed on safety problems.

More than 50 delegates to Flight Safety Foundation's annual seminar agreed that these problems must be met before turbine liner operations will be feasible in the U. S.

After deliberating the problems of civil jets, the representatives of U. S., British and Canadian airlines and aircraft and engine producers were briefed on USAF's approach to flight safety in the operation of turbine-powered aircraft.

The seminar also discussed design compromise in the interest of safety, dangerous cargo and emergency check lists.

▶ **Safety Awards**—At the foundation's annual award dinner, contributions toward greater safety in the fields of fire protection, cockpit standardization and human engineering were given recognition.

Jerome Lederer, managing director of the foundation presented awards on behalf of AVIATION WEEK for "achievement in safer utilization of aircraft."

Awards for 1953: Dr. Ross A. McFarland, associate professor of industrial hygiene, Harvard School of Public Health, for his book "Human Factors in Air Transportation"; M. G. Beard and his committee of the Society of Automotive Engineers for work on cockpit standardization, and I. Irving Pinkel and his associates at the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics for research into the causes of aircraft fires.

▶ **Productive Sessions**—Seminar sessions were closed to the press to allow free discussion of industry safety problems. Lederer termed them "very productive."

On dangerous cargo, those attending the seminar agreed further education of shippers is necessary, rather than more extensive regulation.

Check-list discussions emphasized the need for full training of air crews and greater exchange of emergency information within the industry.

"On the items of smoke removal," said one speaker, "one list makes a very precise point of opening an exit over the wing before opening a pilot window so the smoke will go aft. But another list on the same item simply says open pilot's window and emergency over wing.

"Now, perhaps, the first list was based on knowledge the maker of the second list did not have. A comparison cross-swap should be made."

▶ **AF Accident Analysis**—The second day of the session was devoted to a thorough briefing at nearby Norton AFB, home of USAF's Directorate of Flight Safety Research. Here the group viewed Air Force methods and procedures of accident analysis and prevention.

USAF authorities—including Maj. Gen. Victor E. Bertrandias, Deputy Inspector General, and Brig. Gen. Richard J. OKeefe, director of the Flight Safety Research Office—outlined jet operation problems of the Air Force as well as engineering problems and human factors which are involved in turbine operations.

LAA Copters Start Air Express Service

Los Angeles—Helicopter air express service in and out of Los Angeles was to start Dec. 17. The new service was announced by Clarence M. Belinn, president of Los Angeles Airways, Inc., and W. J. Martindale, general agent of Railway Express Agency.

Cities benefiting from the new service are San Bernardino, Van Nuys and Ontario.

The contract, which was signed only a few days ago, eventually will cover the full Los Angeles airways system.

"This was the next logical step in helicopter service," Belinn explained. "It is the intermediary step, and a necessary one, between carrying mail, which we have been doing, and the final step of carrying passengers."

Present plans call for Los Angeles Airways to start passenger service between Los Angeles International Airport and Long Beach about Apr. 1, according to Belinn. "The company's S-55 helicopter will be used for the passenger service," he said.

Correction

Two teletype transmission errors resulted in incorrect statements in a story on the new de Havilland Comet wing appearing in AVIATION WEEK (Dec. 7, p. 13).

One referred to Comet crashes at Rome and Karachi. Both aircraft involved were Comet 1s, not 2s. A later reference that the Air Registration Board had seen the new wing in action should have said "on a Comet 1 prototype," not Comet 2 prototype. AVIATION WEEK regrets these inaccuracies.

Strike Fizzles

- **North American emerges victor in walkout.**
- **Union accepts company's wage increase proposals.**

Los Angeles—The CIO United Auto Workers finally threw in the towel in what started out as a bitter fight against North American Aviation, Inc., to impose auto wages on the aircraft industry.

"The strike was a kind of fizzle," one UAW spokesmen admitted to AVIATION WEEK.

The union accepted the general wage increase proposal and maintenance of membership originally offered by the company in October. The union struck three North American plants Oct. 15.

▶ **The Agreement**—The final blow to the striking UAW came when employes at Lockheed and Douglas-Santa Monica voted overwhelmingly to accept new contracts giving them raises of 5 to 12 cents an hour.

The principal point of the UAW-NAA agreement was a 4% general wage increase, the company said. This offer provides pay increases ranging from 8 to 20 cents an hour, with additional 4 cents for employes in labor grade one (the highly skilled), and 5 cents more for leadmen. Employes also received a one-cent cost-of-living increase.

▶ **Employe Benefits**—Other points in the settlement included:

- **Increased group insurance benefits** for all employes and their families at no additional cost to them.
- **Six guaranteed paid holidays,** providing pay for holidays falling on weekends. Past practice has been to pay for holidays only when they fell or were celebrated on a regular workday.
- **Three weeks vacation allowance** for employes with 15 years of service.
- **Maintenance of membership** for employes who are or who voluntarily become members of the union. These are the only employes who will be required to maintain their union membership as a condition of employment. Employes who have resigned from the union since the strike started, nonmembers and new hires will not be required to join the union.
- **One-year corporation-wide** master agreement for the bargaining units represented by the UAW-CIO at the Los Angeles and Fresno, Calif., and Columbus, Ohio, plants was agreed upon. In the past there have been three separate agreements.

North American announced that the concessions will add more than $14 million a year to the company's operating costs.

▶ **P&WA Negotiations**—Meanwhile, negotiations for a new contract covering approximately 23,000 workers at three Pratt & Whitney Aircraft Division plants in Connecticut appeared bogged down last week, with the engine maker fighting International Association of Machinists Local 1746 on three major points.

The union, according to a P&WA spokesman, was demanding that the new contract include automatic wage progression to replace the merit system, full compulsory arbitration of any issue the union might want to present and a maintenance-of-membership clause that would require that the company fire any employe who resigned his union membership.

P&WA's offer to the union included a general across-the-board increase of 11 cents hourly; freezing of 17 cents cost-of-living allowance into the base pay; increase of two cents an hour in premium for second-shift night workers to a total of 12 cents; broadening group insurance coverage to include workers' families; increase number of paid holidays from six to seven, with holidays falling on Saturday to be celebrated Friday and those on Sunday observed on Monday.

The engine firm reports that there has been no specific talk of a walkout, although union officials say they have been empowered by the membership to call a strike at any time. The plants represented by IAM are at East Hartford, Southington and Meriden-Portland.

P&WA also is negotiating an initial contract with UAW-CIO representing workers at its North Haven, Conn., facility.

AIA Elects Crawford As Board Chairman

Aircraft Industries Assn.'s board of governors has elected Frederick C. Crawford of Thompson Products as chairman of the board for the first half of 1954.

Gen. Ira C. Eaker, Hughes Aircraft Co., was named to take over as AIA's board chairman during the second six months of next year.

The directors re-elected DeWitt C. Ramsey as president and Harrison Brand, Jr., as secretary-treasurer. New officers included Crawford and Eaker, vice presidents, and Leland D. Webb, vice president and western regional manager.

AIA's executive committee for 1954: Crawford, Eaker, Ramsey, H. Mansfield Horner of United Aircraft Corp., and J. C. Garrett of the Garrett Corp.

Plane Maker Asks Ban On Nonsked's Name

North American Aviation charges in its injunction suit against North American Aircoach System that the nonscheduled airline group is trading on NAA's long-established name.

The Los Angeles company contends it has been prominent as an airframe producer for 25 years and that the nonsked system and its affiliates, including North American Airlines, have profited by its reputation and advertising.

NAA has introduced exhibits during the hearings in a Los Angeles court that are intended to prove confusion exists through the use of similar names.

Civil Aeronautics Board has ordered North American Airlines to change its name on grounds that it is unfair competition with American Airlines (AVIATION WEEK Nov. 30, p. 64).

Airfreighters Offer Defense Supply Plan

Airfreight lines this week will offer Defense Department an air logistic supply program that they propose to operate under contract between principal U. S. industrial plants, military supply depots, operating bases and embarkation ports.

The airfreighters' association, Transport Air Group (TAG), prepared the study and proposal.

TAG also proposes to follow through on the offer by providing Defense Department with a "technical advisory service on cargo preparation, handling and control and a traffic liaison service to assist in accommodating localized high-density traffic and unbalanced traffic flow."

▶ **Route Pattern**—TAG's preliminary, domestic program proposes that its 25-plane reserve capacity be utilized on a route pattern, scheduling DC-4s on long trunk routes and C-46s on shorter-haul, smaller-volume services.

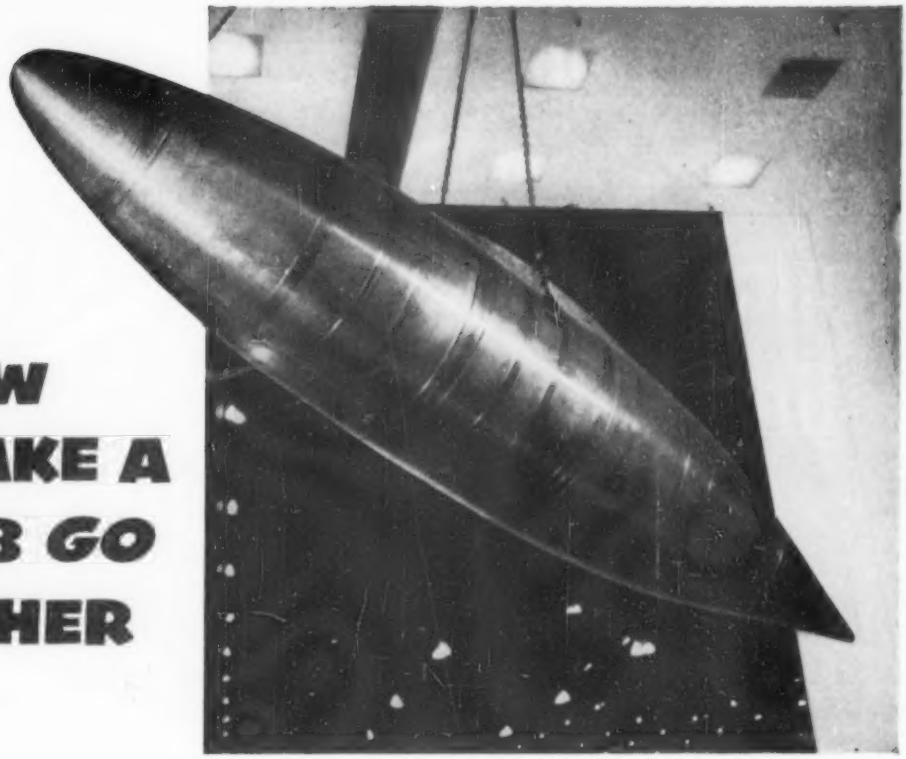
TAG carriers have the capacity and the plan "to put into military transport service and maintain an estimated 25 air transports within days," the report states.

The studies were prepared by TAG executive vice president L. R. Hackney and George Beiser, former executive assistant to the USAF Assistant Secretary for Research and Development.

Hackney said aim of the study is to show how civil airfreight lines can augment and provide low-cost fixed-route supply services for the military in both peace and war, eliminating delays, damage and heavy inventory.

TAG's proposed activities would be supplemental to the Military Air Transport Service, Hackney said.

HOW TO MAKE A BOMB GO FARTHER



What you see pictured above is not a bomb — but a droppable fuel tank, one of many types built by Goodyear Aircraft Corporation to increase the effective striking range of bombers.

Attached under the plane's wings, these tanks are rigged so that they can be released in flight after the fuel has been used. Unimpeded, the bomber flies the rest of the way to its far-off target — and back — on the fuel provided by its regular, inboard supply.

These lightweight, all-metal tanks require no liner — are absolutely "fuel proof," pass exacting slosh and vibration tests. Precision engineered, some are designed so that they can be shipped "knocked down" — telescoped to one-third size for easy handling and storage — then assembled in a matter of minutes when needed.

Goodyear Aircraft produces many types of fuel tanks and cells for both commercial and military aircraft — drawing on experience that goes back to 1920 when Goodyear engineers designed the first successful bullet-sealing tank in aviation history.

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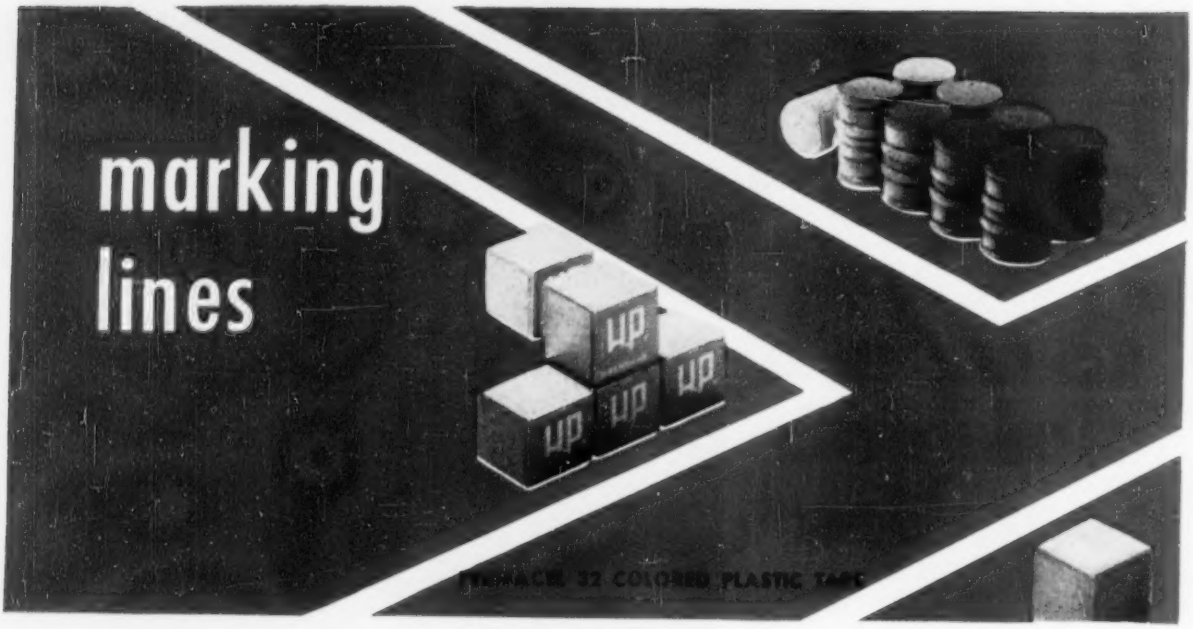

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Dutch Plan Copter Industry at Rotterdam

A group of Dutch helicopter enthusiasts, industrialists, and city officials at Rotterdam, Holland, have organized the Rotterdam Helicopter Syndicate to make the city a national and international copter center.

Chief purpose of the syndicate is to plan for construction of heliports in various European cities and establish a helicopter industry in Rotterdam. The city has a heliport in its downtown district used by Sabena, Belgian Air Lines, in its European copter service.

The group hopes to interest American and European helicopter manufacturers in establishing branch factories at Rotterdam. Its study is being financed with $26,000 from funds raised in 1950 by the city's Airport Foundation for construction of an international field.

Despite the Netherlands' government rejection, the foundation is pushing its plan to build the field and attract aircraft builders to the airport area.

Aero Supply Director Buys 12,785 Shares

Aero Supply Mfg. Co., Inc. had the biggest stock transactions of any registered aviation firm during October, Securities & Exchange Commission reports.

Aero common shares totaling 12,785 were acquired beneficially by William H. Coleman, a director, through a holding company, increasing his total holdings to 16,685.

Other transactions:

Avro Mfg. Co.: Victor Emanuel, officer and director, sold all 2,250 of his $2.25 cumulative convertible preferred shares.

Beech Aircraft Corp.: Frank E. Hedrick, officer and director, bought 900 common shares, making a total holding of 2,650.

Bell Aircraft Corp.: Page Hufty, director, bought 400 common shares directly and acquired 300 common shares through a trust, making a direct and indirect total holding of 439,976 common shares; Ray P. Whitman, officer and director, sold 1,500 common shares leaving him a total of 4,000.

Capital Airlines, Inc.: Raymond G. Lochiel, officer, acquired 600 common shares through exercise of rights, making an 5,115-share holding; Lochiel also exchanged or converted 600 options for common shares, of which he holds 2,700.

Cessna Aircraft Co.: Sheldon Coleman, director, bought 200 common shares, making a total of 800.

Colonial Airlines, Inc.: Joseph Shields, director, sold 500 common shares leaving him with 500 total.

Curtiss-Wright Corp.: S. M. Irwin, officer, acquired 200 common shares beneficially, his total holdings of that type of stock.

Eastern Air Lines, Inc.: Morris M. Frost, officer, bought 100 common shares, making a total of 1,400.

Fairchild Engine & Airplane Corp.: Richard C. Boutelle, president, bought 100 common shares, making a total holding of 1,000.

Lockheed Aircraft Corp.: Daniel J. Haughton, officer, bought 550 capital shares, making an 1,940-share total; K. V. Samp-

NEWS SIDELIGHTS

Canada's Department of Transport is reported to have an electronically equipped sighting station set up at Shirley's Bay to record passage of flying saucers in the Ottawa vicinity. Transport Minister Lionel Chevrier has reported the station's job is to assist work of the government's National Research Council. Defense Research Board has disclaimed any knowledge of the station. As a result, Canadians are not sure if there is a serious effort being made to look for saucers. Equipment at the station: a gravometer imported from Sweden, a magnetometer, a radio receiver operating on 530 kc., and a counter to detect cosmic rays from the outer atmosphere.

A press report that Britain is developing an atomic powerplant for aircraft from techniques learned in producing a "small" A-bomb brought this comment from AVIATION WEEK's London correspondent: "Nobody here for a minute contends that Britain is anywhere near as far along in propulsive atomic power as is the U.S. . . . I am almost positive there is no atomic aircraft project actually under way here."

Concerning the Boeing jet transport due to fly next year, one of Boeing's chief competitors has this to say: "I only hope we learn enough from it to get out a better one before they steal all the market."

The frame dancehall-bar and eight-room ranch home of Florence Lowe (Pancho) Barnes, former women's airspeed record holder, near Edwards AFB was destroyed by fire last month. Pancho's establishment was well known to fliers of the nearby ARDC flight test center. Firemen from the base helped fight the blaze. The resort played a prominent role in court last April when she testified that Brig. Gen. J. Stanley Holtoner, commanding officer of the airbase, had threatened publicly to bomb the establishment. Still pending is her suit against the government in which she is asking $1,253,546 on charges of conspiracy, harassment, fraud and deceit in federal attempts to take over her property for expansion of Edwards AFB.

Lt. Col. Jackie Ridley, chief of flight test engineering at Edwards AFB, may soon attempt to take over the title of world's fastest pilot. One report from Edwards says he will pilot the Bell X-1A in an assault on the 1,327-mph. mark set by NACA's Scott Crossfield in the Douglas Skyrocket.

No flying saucer turned up at San Diego's Airpower Day celebration, attended by 200,000, although an official invitation was extended "to the pilot or commander of any such space vehicle to land at the Miramar Naval Air Station during the air show program, from 10 a.m. to 4 p.m., Pacific Standard Time, which is 1800 hours to 2400 hours Greenwich Mean Time, Nov. 22." The invitation was conditional on the pilot or commander of the subject aircraft making radio contact with the operations office of Miramar "prior to approaching within 100 statute miles of the station, which is located at Latitude 32 deg. 52 min. North and Longitude 117 deg. 8 min. West," and on the following radio communications frequencies: VHF 142.74 mc. or 138.78 mc.; UHF 233.8 mc., and MHF 3023.5 mc. If lacking radio communications facilities, the pilot of the non-Earth aircraft was requested to make visual contact with the station at a mean altitude of not less than 50,000 ft. above sea level and directly overhead so that escort aircraft might guide him to a landing. No saucers turned up to take advantage of the landing area or adequate security facilities promised for protection of the saucer and crew, however.

USAF has retired the first U. S. jet bomber, the twin-jet Douglas B-43. It will be turned over to the National Air Museum of the Smithsonian Institution. The B-43, which made its first flight in 1946, has been used at Edwards AFB as a flying test bed for the J35 and J47 series engines.

Douglas' DC-7 actually received its CAA certification on Friday, Nov. 13, but to avoid hanging a Friday-the-13th jinx on the aircraft, the CAA ticket was dated Nov. 12.

Although designated an attack aircraft, the Douglas A4D, so-called lightweight "Heinemann Hotrod," actually will be smaller than the F4D fighter. Cockpit simplicity of the new aircraft is one feature bringing cheers from pilots who have seen the mockup.

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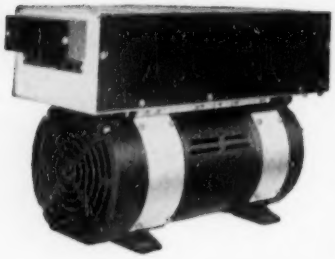

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INVERTERS—400 CYCLE OUTPUT

Type Number	INPUT		OUTPUT			Approx. Weight Lbs.	Max. Alt. Feet	Designed to Govt. Part No.
	Volts	Amps	Volts	Phase	VA Rating			
12128	27.5	1	26	1	6	5	35000	AN3496-1 AF
MG-54	27.5	22	115/200	1	250	18	65000	E-51A1A-9 Navy
				3	250			
12142	27.5	22	115	1	250	13	35000	N17158 Navy
				3	250			
12146	27.5	22	115	1	250	13	35000	53B6239 AF
MG-60	27.5	22	115	1	250	17	65000	53B6239 AF
MG-62	27.5	22	115	3	250	17	65000	AN3532-2
32E01	27.5	35	115	1	500	26	50000	AN3533-1
				3	500			
32E00	27.5	45-54	115	1	500	34	50000	AN3534-1
				3	750			
MG-44	27.5	55	115/200	1	750	35	50000	E-52804-2 Navy
				3	750			
MG-57	27.5	100	115/200	1	1250	42	50000	E1737-1 Navy
				3	1500			
MG-61	27.5	100	115	1	1500	51	65000	—
MG-64	27.5	100	115	3	1500	51	65000	—
1518 Mod. 1 & 2	27.5	130	115	1	1500	37.5	20000	—
				3	1800			
1518 Mod. 5	27.5	130	115	1	1500	37.5	35000	—
				3	1800			
32E06	27.5	180	115/200	1	2250	56	50000	E1725-1 Navy
				3	2500			
32E03	27.5	180	115	1	2500	56	50000	AN3516-1
32E09	27.5	180	115	1	2500	56	50000	—
				3	3000			

NOTE: D.C. Input voltage shown is a nominal value of 27.5 volts, but all units are designed to operate from 26 to 29 volts. Input Amperes shown are values at 27.5 volt input.

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son, officer, bought 300 capital shares, increasing his total to 605.

National Airlines, Inc.: Walter F. Johnston, officer, bought 500 common shares, making a total of 1,305.

National Aviation Corp.: Elmer Wellin, director, sold 2,800 common shares, leaving a total of 6,400.

Northwest Airlines, Inc.: Wheelock Whitney, director, bought 100 common shares, making a total of 400; he acquired 200 common shares beneficially through Whitney Securities Co., increasing his total holding to 500 shares of that type stock, and sold 300 common shares through Whitney Land Co., that company's total common holding; Whitney also bought 100 4.6% preference stock shares, making a 900-share total; he sold 300 shares of the same stock held through Whitney Securities Co., leaving 600 shares, and bought 100 shares of the same stock through Whitney Land Co., making a total of 500.

Seaboard & Western Airlines, Inc.: Carl D. Brell, officer, sold 1,000 common shares, leaving 33,725; Arthur V. Norden, officer and director, sold 1,200 common shares, leaving 35,221; and Raymond A. Norden, officer and director, sold 650 common shares, leaving 32,437.

Western Air Lines, Inc.: Arthur F. Kelly, officer, bought 500 capital shares, his total holdings.

Business Steps Up Use of Lightplanes

Piper Aircraft Corp.'s distributors sold 1,573 planes during the past year—a marked gain over the previous year's 1,161 and an indication of steadily increasing use of light aircraft for business.

Analysis of civilian purchasers of Piper Tri-Pacer, Pacer and Super Cubs shows this ownership distribution: farmers and ranchers, 22.5%; manufacturers, 17%; construction firms, 14.5%; physicians and doctors, 13.4%; wholesalers and distributors, 6.7%; engineers and architects, 6.2%; salesmen, 5.5%; automobile dealers, 4.1%; all others, 10.1%.

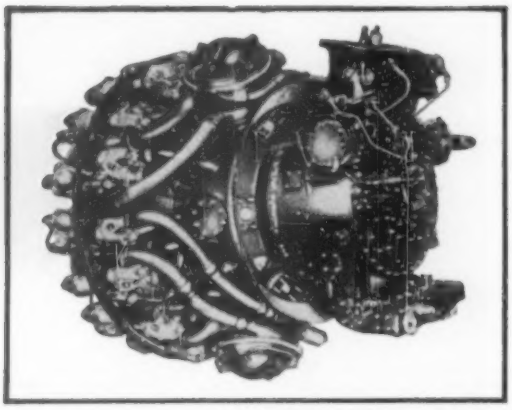
► **Increased Utility**—Breakdown of the past year's sales reveals that 67.4% of Piper owners are using their planes 100% for business purposes, compared with 40% two years ago.

Increased utility through the use of the latest radio aids and instruments is seen by the company as contributing heavily to these gains. It is estimated that 59% of Piper owners have planes equipped with VOR omni radio receivers, compared with 45.9% in 1952.

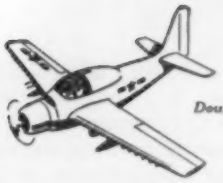
Installation of VHF transmitters has grown even more rapidly: 84.4% of the Pipers sold are so equipped, compared with 4% two years ago; and 50.9% of the company's planes now have advanced flight instruments, whereas only 8% carried them in 1951.

► **Plane Use Increases**—Piper owners report that they used their planes approximately 331 hr. this past year. One Tri-Pacer owned by a printing concern flew more than 1,200 hr. in one year.

The Tri-Pacer continued as the most popular model in the Piper line, with sales more than six to one over the similar Pacer four-seater with conventional tailwheel.



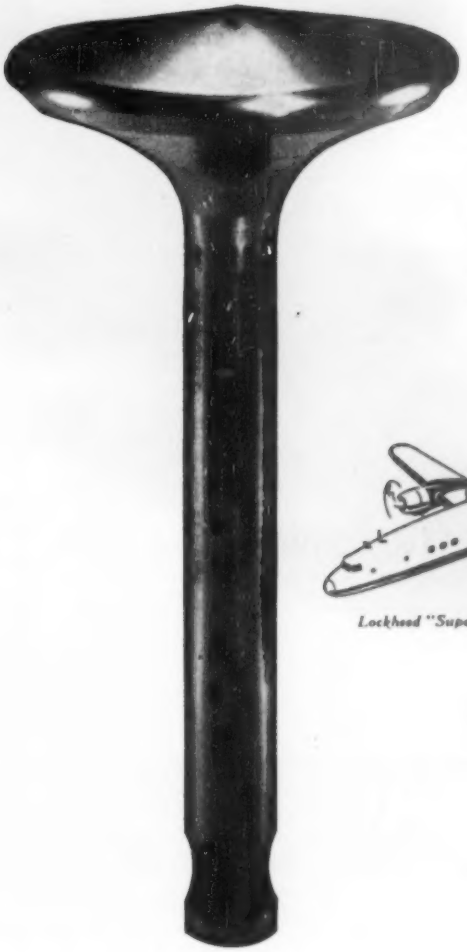
Wright Turbo Compound Aircraft Engine



Douglas "Skyraider"

they fly on Wright Engines...
with THOMPSON VALVES

Martin "Marlin"



For a Douglas "Skyraider", a Martin "Marlin" or a Lockheed "Super-Connie" . . . Wright engines deliver the power for smooth commercial flights or teeth-jarring combat maneuvers.

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Lockheed "Super Constellation"

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Thompson Products, Inc.

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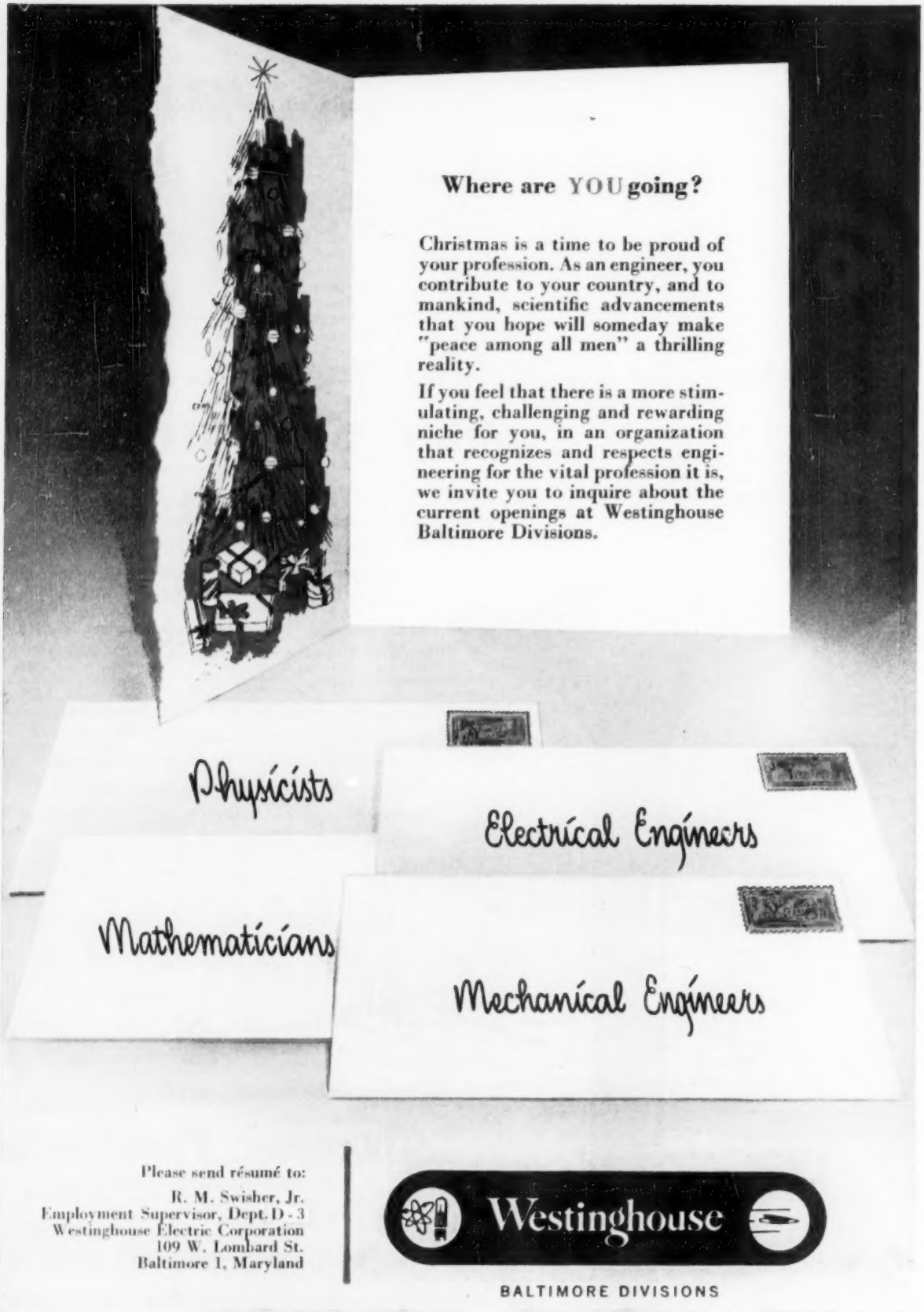
Where are YOU going?
Christmas is a time to be proud of your profession. As an engineer, you contribute to your country, and to mankind, scientific advancements that you hope will someday make "peace among all men" a thrilling reality.
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WHAT'S NEW

New Books

The Science of Precision Measurement, by the DoAll Co., 254 North Laurel Ave., Des Plaines, Ill., 264 pages, numerous illustrations. Price: $3.50.

The maintenance of clearances and tolerances, so necessary in modern aircraft, is of constant concern to design and manufacturing personnel. This greatly expanded version of the precision measurement textbook previously issued by DoAll discusses use of the wavelength of light as the basis of contemporary practice in this field and its application in the form of gage blocks. The book also covers data on angle measurements, use of optical flats, interpretations of fringe lines, use of comparators, checking of micrometers, thread and gear measurements and the like.

Telling the Market

A 51-page manual for operation, maintenance and overhaul of **commercial carrier oxygen equipment** is available from Puritan Compressed Gas Corp, 2012 Grand Ave., Kansas City 8, Mo. . . . Optical Gaging Products, Inc., is issuing a new brochure giving complete description of the **Optical Projection Comparator** made by American Optical Co. Write Optical Gaging Products, 26 Forbes St., Rochester, N. Y. . . . **Three-dimensional drafting** is described in a new catalog being put out by John R. Cassell Co., Inc., 110 W. 42nd St., New York 36, N. Y. Catalog also shows Instrumaster implements used in 3D drawing.

New process bulletin on **calcerite-A compounds,** used in large duplicating patterns, is now available from Furane Plastics, Inc., 4516 Brazil St., Los Angeles 39, Calif. . . . Brochure describing **electrostatic voltmeter and peak voltage adapter** is offered by Sensitive Research Instrument Corp., 9-11 Elm Ave., Mount Vernon, N. Y. . . . A 24-page illustrated handbook, describing **fastening specialties,** with section devoted to each of seven different fastener types, has been issued by Southco Division of South Chester Corp., 1400 Finance Bldg., Philadelphia 2.

Facilities for custom **aluminum extrusion and roll-forming** of aluminum and stainless steel are described in a folder available from R. D. Werner Co., Inc., 295 Fifth Ave., New York 16, N. Y. . . . **Endothermic gas generator** which produces a controlled atmosphere for heat-treating is detailed in Bulletin 753.

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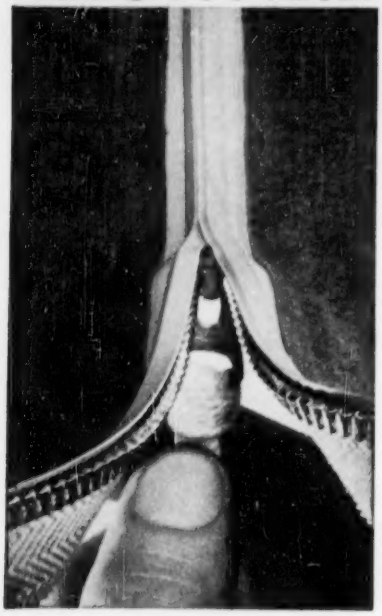

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Write Hevi Duty Electric Co., Milwaukee 1,Wis. . . . **Small hole drilling machine** having variable speeds is illustrated and described in Bulletin V-53. This publication is available at present from Hamilton Tool Co., Hamilton, Ohio.

Heat-treated precision pressure plugs, which seal tight without sealing compound are discussed in a bulletin issued by Standard Pressed Steel Co., Jenkintown, Pa. . . . **Gear and rack applications** are described in a folder available from Worcester Gear Works, Inc., Dept. 73, 18 Grafton St., Worcester 8, Mass. . . . Catalog describes **two-dimensional Repro-Templets** for machine tools, shop, office, materials handling equipment and other installations for plant layout planning. Samples are also attached in catalog, that may be obtained from Repro-Templets, Inc., Oakmont, Pa. . . .

Quality Control Through Radiography is a brochure demonstrating the applications of radiographic non-destructive testing. Address requests to Industrial X-Ray, Inc., West Hempstead, N. Y.

A 1953-54 Reference Guide to Dow Corning silicone products also covers their operating and service characteristics. Write Dow Corning Corp., Midland, Mich. . . . **Horizontal hole punching units** designed to work on curved and straight flanges, rims and angles are detailed in Catalog H being issued by Wales-Strippit Corp., 345 Payne Ave., North Tonawanda, N. Y. . . . Pocket-size easy-to-read **decimal-equivalent, tap-and-screw thread chart** printed on vinylite is available from Reiff & Nestor, Lykens, Pa.

Watertight panel instruments, measuring 1½ in., are featured in technical bulletins Model 112 and Model 120, complete with illustrations and general specifications. Write to DeJur-Amsco Corp., 45-01 Northern Blvd., Long Island City 1, N. Y.

Publications Received

- **Tax Planning for Foundations and Charitable Giving,** by William J. Casey and J. K. Lasser, pub. by Business Reports, Inc., Roslyn, N. Y., $12.50, 236 pages. Analysis by a CPA and a lawyer deals with the public policy which gives tax concessions for charitable gifts made by individuals and businesses.
- **Fundamentals of Electronic Motion**—by Willis A. Harman—pub. by McGraw-Hill Book Co., Inc., 330 W. 42d St., New York 36, N. Y.—319 pp.—$6.50. Author, associate professor of electrical engineering at Stanford University, presents analytical study of the behavior of electron tubes. Illustrative problems.
- **Flying Saucers from Outer Space**—by Maj. Donald E. Keyhoe—pub. by Henry Holt & Co., 383 Madison Ave., New York 17, N. Y. $3.00. Maj. Keyhoe believes the saucers are interplanetary signs.
- **How We Invented the Airplane**—by Orville Wright—pub. by David McKay Co., Inc., 55 Fifth Ave., New York 3, N. Y.—78 pages—$1.75. Long-buried in the Library of Congress, this is Orville Wright's story of how he and his brother invented the airplane.
- **Space Travel**—by Kenneth W. Gatland and Anthony M. Kunesch—pub. by Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y.—205 pages—$4.75. Rocket development from earliest days to present propellants is discussed and analyzed in the light of modern scientific developments.
- **Nuclear Physics**—by W. Heisenberg—pub. by Philosophical Library, Inc., 15 E. 40th St., New York 16, N. Y.—225 pages—$4.75. Lecture-type presentation of atomic theory and nuclear science from its beginning to the present is intended for the non-professional.
- **Flight: A Pictorial History of Aviation**—by Editors of Year—pub. by Simon and Schuster, Inc., 630 Fifth Ave., New York 20, N. Y.—$10.00—192 pages. Includes development of commercial aviation, the wars, aviation pioneers.
- **Famous Airports of the World**—by Ansel Edward Talbert—pub. by Random House, New York, N. Y.—$1.75—96 pages. Collection of odd and technical facts on the world's airports for young people.

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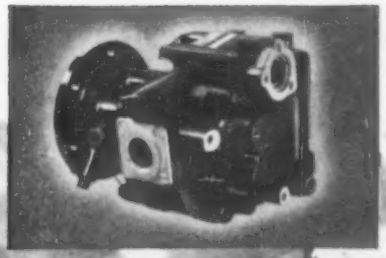

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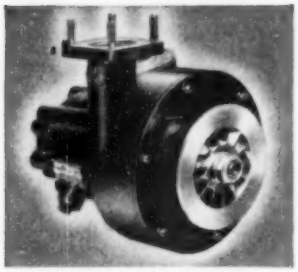

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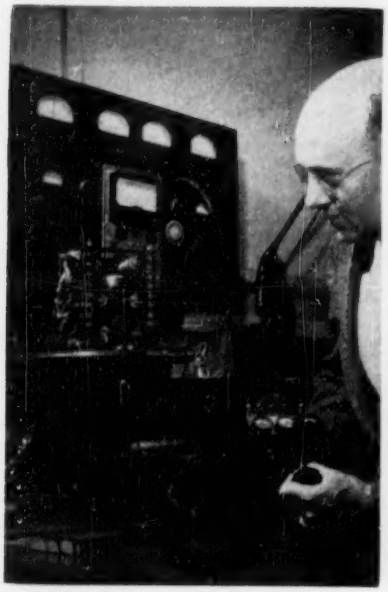
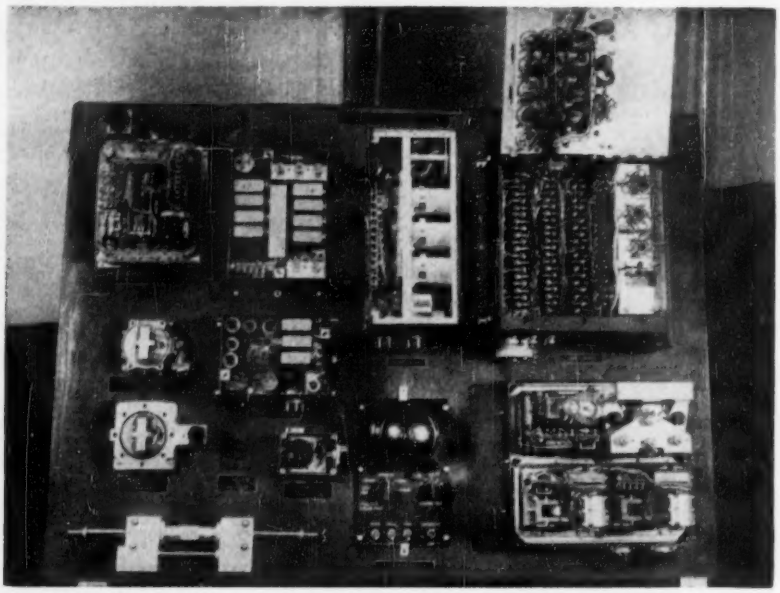


RESEARCH on autopilot phases into . . .



DEVELOPMENT and preparation of first product design. Now comes big jump to . . .

No Easy Path From R&D to Production

But here are ground rules to ease the headaches of transition, Godsey says. They apply both to industry and the government.

By Frank W. Godsey, Jr.*

The transition of a new product or process from the research and development phase into a completed production design frequently presents unknown hazards as abrupt and potentially as violent as passing through the sonic barrier with a new airplane. The relatively friendly environment of the research laboratory suddenly is exchanged for the harsh requirements of customer performance specifications. Many promising new developments fail to make the transformation.

One of management's most important and difficult problems is to guide development into production—smoothly and quickly. A failure to do this consistently can and frequently does result in large financial losses, if not in eventual failure of a business. To the extent that exhausted appropriations without useful results are the equivalent of business failure, the same conditions also apply to the various branches of the Defense Department.

▶**Simple to Complex**—This problem runs the gamut from small, simple devices through the complicated industrial control device systems and complete weapons systems in the military.

In the case of the single, simple device, so lacking in complexity that one person can have complete familiarity with it and all of its uses, the problem is relatively easy. Frequently the inventor not only is capable of proving the workability of his invention or design improvement, but also is thoroughly familiar with the conditions under which the finished article is to be used, knows the capabilities and limitations of the manufacturing plant that will produce it. He conceives the product, proves its worth and practicability, in many instances goes out and gets customer orders for it, designs it for production, and then places it in manufacture and ships it to his customers. The process is the beginning basis of much of our American industry.

However, there are needs for devices, the complexity of which is so great as to exceed the ability of any one individual or small group to accomplish all of the foregoing tasks within a reasonable time period.

A really comprehensive airborne fire control system, for example, may require several hundred man-years of engineering effort to carry it through the research and development (R&D) stages and through production design to the point where it is ready for initial production trials. The most competent inventor-designer in the world would not live long enough to finish the job. And since, as a rule, it must be done in from two to four years, it is necessary to put a hundred or more engineers to work on the project.

▶**Big Job, Small Groups**—Further, no one person is apt to have all of the state-of-the-art knowledge necessary to carry out the multitude of research, development, and design tasks in a satisfactory manner, much less know the details of environmental conditions and uses to which the ultimate user will subject the completed product.

It, therefore, becomes a practical necessity to divide the overall project into separate tasks that can be assigned to small, coherent groups. Each group must be skilled in some particular phase of the problem, have at least a speaking acquaintance with the "facts of life" in the other immediate adjacent groups.

Not the least important of these groups is the management staff that must guide and direct the activities of the other groups, arbitrate disagree-

*Manager, Baltimore Divisions, Westinghouse Electric Corp.

PRODUCTION, the payoff. This is the initial assembly line at Westinghouse Air Arm Plant, where the autopilot is produced.

ments between groups, make the sometimes difficult decisions as to when to shift emphasis from one phase of the project to another. The work of a symphony orchestra conductor is child's play compared with this management responsibility—the conductor at least has an opportunity to rehearse the score before the full-dress performance.

▶ **Ramifications**—In both industry and the Defense Department, needs for new products are recognized when a new idea is offered by an outsider, or more frequently, when the need is generated by the customer or the using service and is made known to the normal supplying agency.

Once again, if the new device is sufficiently limited in compleexity that one man or a small group of people can encompass all of its problems and possibilities, there are relatively few management difficulties in carrying it through research, the development or breadboard stage in the case of electronics, production design, environmental testing, and finally production proof runs.

▶ **Headaches Begin**—But if it is just just slightly more complex than this, the headaches start. The R&D phases require more than simple calculations and laboratory experimentation to show if there is a possibility of eventual success. If the project is a system of some complexity with many interacting parts and subject to a number of external influences, extensive mathematical analyses may be necessary—with or without the aid of computers or analog devices. Steady-state and transient disturbance conditions require investigation to determine stability and response characteristics of the system as a whole.

Almost invariably, some inventing must be done to supply needed but previously unavailable components. These must also make the circuit of the R&D laboratories to prove a principle and their general practicability, and usually the existing state-of-the-art information is found to be inadejuate.

These R & D investigations, carried out in response to either internal or external stimulations, usually proceed to the point where a principle is either proved or disproved with the aid of some elementary hardware. The laboratory in which the work is done may require unusual extensions in the case of defense products, such as flight-test aircraft, missile proving grounds, etc. Nevertheless, it is still laboratory work with R&D personnel doing the job.

▶ **Production's Big Role**—Industrial research usually is paid for out of the reserve funds of the sponsoring company with the expectation of profiting through the sale or use of the product or process. R&D for military products sometimes is financed in the same way with risk capital from industry. But most frequently, military R&D is paid for directly by the government.

These R&D contracts may be placed directly in government-owned and-operated laboratories, or negotiated with university or non-profit research organizations, with commercial consulting-and development organizations without production facilities, or with industrial companies which have R&D laboratory facilities and personnel as an adjunct to their normal manufacturing operations.

Ordinarily, the blue-sky type of assignment does reasonably well in the university or government laboratory,

Target: Production

There is hardly a product made today for use in the aviation field, which is not required to undergo painstaking step-by-step progress before it is ready to meet the rigorous and exacting demands of modern-day acronautical service.

• Research, development and production are the three vital phases the product normally passes through before this state of perfection is reached. The ramifications of these transitional phases and the way each phase keys with the others have caused many a problem in the effort to attain target results. Yet, comparatively little information has been published on the subject.

• A broad analysis of the interaction of research, development and production, with keen observations aimed at problem solution, is presented in this article, prepared for Aviation Week by Frank W. Godsey, Jr., Westinghouse Electric Corp.'s Baltimore Divisions manager.

but as a project begins to approach the hardware stage there is almost always rapidly increasing evidence of a real need for the direct influence of a practicing manufacturing organization on the scene. There are some notable exceptions to this statement, but they are very few in number.

The most difficult and financially dangerous period in the history of a new product is the transition from R & D to production design. The principles have been proved, or proof is in sight, and management commits itself to go ahead with a final design.

But there are still many problems only partially solved, the customer's specifications are in the usual state of high flux, and the uninitiated are unaware that the worst is yet to come, with perhaps as much as 90% and certainly not less than 70% of the necessary money and effort still to be expended to carry the project through to the first proved production unit.

▶ **Production-Design Approaches**—The selection of an engineering group to take the project out of the development stage and deliver finished drawings and specifications to the manufacturing department may become a critical problem. If the device is to be produced finally in a government-owned-and-operated plant or arsenal that has a design engineering department attached to it, the design job frequently is assigned to the ultimate producing agency. If there is no suitable government design department available, then the job may be given to a company specializing in engineering design contracts. Very few manufacturing corporations will divert their own production-design engineering to products which they will not be permitted to produce.

The use of independent design organizations has been employed by some of the Defense departments even in instances where the ultimate producer definitely is to be an industrial organization. The injection of an independent production-design group between the R&D laboratories and the final producer has been proved to be an inefficient process, wasteful of time, manpower, and money.

There is much evidence to prove this point. In World War II, many industrial organizations short of engineering design manpower were forced to hire additional effort from independent design companies. Almost uniformly, the final results were more costly than when carried out in their own organizations; and due to lack of familiarity with the final producer's manufacturing facilities, frequent redesigns were necessary.

Whenever it is possible to do so, the ultimate producer should be given the responsibility for engineering the production design. Second-source manufacturers with less adequate engineering capabilities may then be chosen, but the prime source has to shake down early production troubles. This can best be done if the engineering design group is under the same prime-source management and knows the capabilities of its own production facilities.

If the prime source does not have the required engineering department necessary to do the production design work, then there may be serious doubt that the right production organization has been chosen for the initial manufacturing assignment.

▶ **Control of Research**—Large industrial enterprises engaged in projects beyond the scope of the simple one-man-design type of product have increasingly found it desirable to exercise a firm measure of control over the scope of research phases of such projects.

There is a natural understandable tendency on the part of the R&D team to continue to revise and perfect the product far beyond the point at which it would normally be turned over to the production design section of the engineering department. The result is that the R&D people gradually creep into the functions of another department, trying to research the product and simultaneously design it for production.

There are not many procedures that

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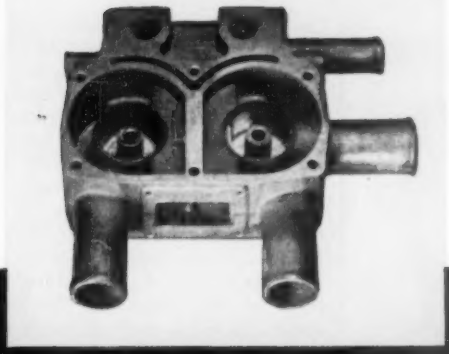
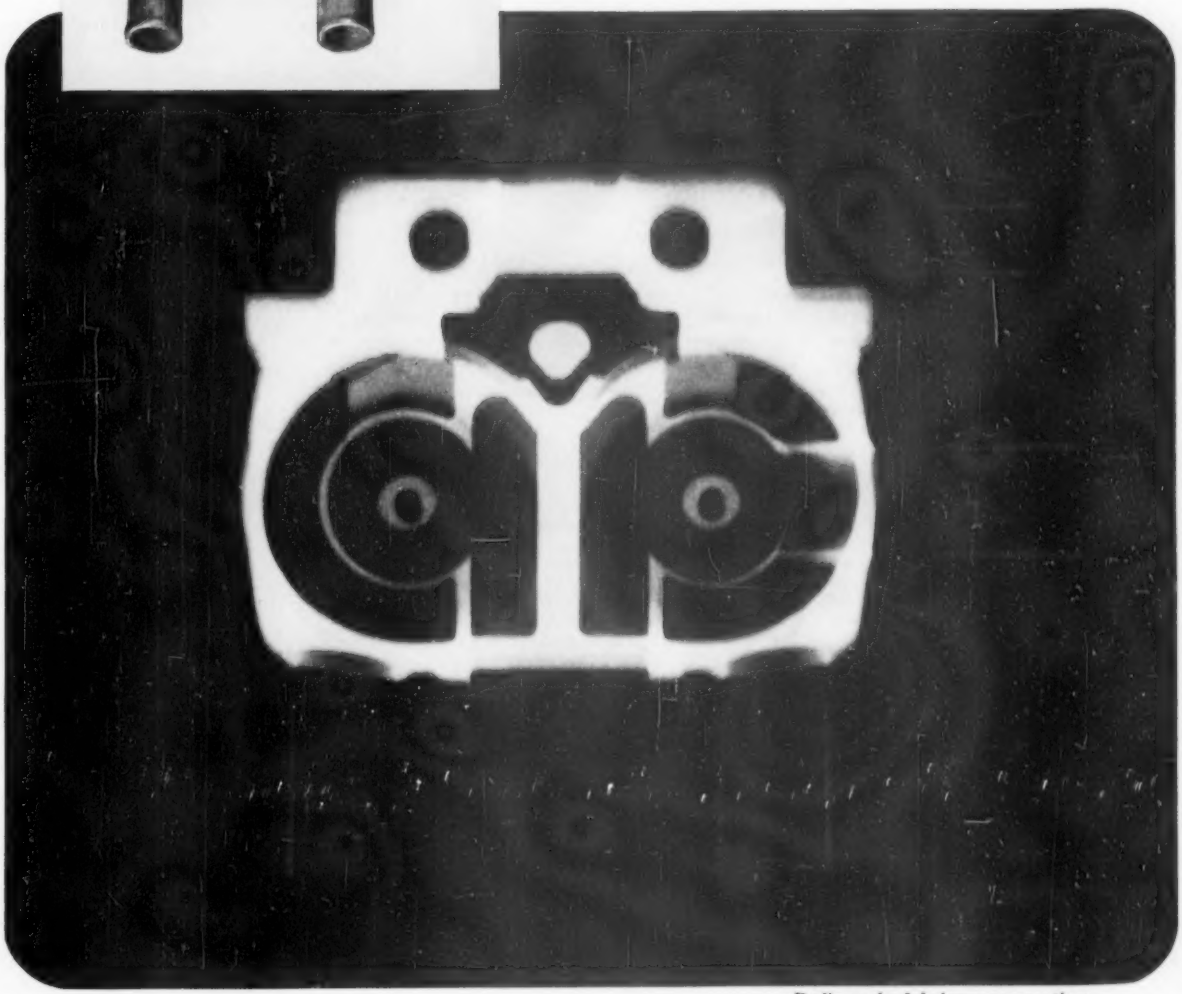


This heart must pulse or the Plane's in trouble—



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Valve Talk

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by Marvin Miles,
Senior Member, Aviation Writers Assn.

There are two ways to look at experience—

With Bacon: "By far the best proof is experience."

Or with Pope: "Sad experience leaves no room for doubt."

It seems to me that both philosophies can be applied to the problem of the inexperienced supplier, the concern that pushes rashly into a highly technical field to grab off business with promises and price cuts that cloak limited capability.

There can be no doubt that experience pays off as far as design techniques and production methods are concerned. And there's ample evidence that many a major company dealing with opportunist suppliers has found that "Sad experience leaves no room for doubt."

Now don't get me wrong. I'm a taxpayer, too, and I'm for solid business growth, honest competition and sound cost reduction. The question is whether the untutored hopefuls can bring these three economic benefits to the industry.

Competition engendered between original suppliers and second sources of comparable experience is good business and should be encouraged. It keeps both sources on their toes and it helps reduce costs. Yet it doesn't impair quality.

On the other hand what has happened from time to time when the trial-and-error outfits have shouldered their way into the picture?

Bland promises . . . ridiculous prices . . . inept production . . . poor quality . . . delivery delays . . . even to chaos, panic and costly cancellations – and probably eventual "bail out" by original suppliers.

You won't find the military services or the airlines awarding important contracts to unqualified concerns. They'll back reliance and proved performance every time. And while no supplier has a corner on ability, it's a basic truth that know-how can't be achieved overnight. Furthermore it's almost certain that an inexperienced supplier won't know what NOT to do.

Ask the qualified supply people how many times they've been called frantically to the rescue after some eager new source of limited capability failed to make good on paper promises. Ask them about "rescue" procedures, interrupted production lines, fouled-up planning, lost time and increased expenses involved in handling emergency trouble orders.

It would appear to me that if a second source is needed as a back-stop for any engineering item there should be no doubt – if time, trouble and money are to be saved – that the business should go to a supplier of recognized achievement in the specific field concerned.

This is not to criticize the small companies that are doing their best to grow and expand in healthy increments. Every concern starts small and has an undeniable right to all the business it can handle efficiently. It's the outfit that jumps in over its head and then has to be bailed out that plagues the aviation industry.

No doubt it's easy sometimes to figure that "X" Company can turn out units that will be interchangeable and equally dependable with those of an original source. Unfortunately, it doesn't always work out.

Although X Company has things all figured out – on paper – it runs into unforeseen snags . . . finds the intricacies of functional perfection too difficult to surmount . . . stalls on delivery, fails acceptance tests, holds up airframe schedules. The eventual cost to the customer is boosted, not reduced. Not every time, of course, but all too frequently.

I don't refer to licensed second sources wherein a company formally approves the production of its designs by another concern, with tooling and full technical help provided. Nor is there any question among expert suppliers themselves when a second source is named from among their ranks.

The veteran suppliers know that sound competition is healthy. They recognize that adept rivalry, constant and dependable production, profit laws and renegotiation will keep costs down – well below the final level of the opportunist hopefuls. And they know furthermore that their units will stand up under the searching rigors of field use.

The whole industry knows this, too.

Yet the inexperienced supplier – and his inevitable cost fumbling – has been with us for a long time, increasingly so since Korea.

Why?

can result more disastrously in destroying any possibility of meeting management's cost targets and delivery promises to the customer. The researcher may be a perfectly capable designer, but it is more likely that he will be found doing only a makeshift job of either research or design if he attempts to do both simultaneously.

▶ **Responsibility Transition**—There is a logical solution followed by successful industry management in getting at this problem. At a point in the program where the R&D work indicates a high probability of a successful product, management, usually in the form of the engineering manager, lifts projects responsibility from the hands of the R&D section and firmly places it in the hands of the production design section manager in the engineering department.

It also is desirable that a strong liaison be established between the engineering design group and the manufacturing department at this point, preferably through manufacturing engineers attached to the manufacturing staff.

From that point on until the job is turned over to the manufacturing department, its destiny is controlled by the production design people. The R&D group still works on the project in a consulting and advisory capacity, but they no longer have the authority to enforce design changes.

This is not a painful procedure when the ground rules are understood by all concerned. There is a certain measure of relief for the researcher in being freed of design responsibility, and his effectiveness as an advisor and consultant is greatly enhanced in most instances.

▶ **Going Too Far**—Unfortunately, some of industry and practically all of the Defense departments fail to follow this practice. Even when the production design agency, whether in industry or in government departments, has a clearly written commitment, with systems responsibility spelled out in detail, R&D people are not separated from indirect control of the project.

Directly in the face of the contract or through the subterfuge of specifications and environmental testing, they frequently continue to spell out the thread sizes on every last nut and bolt. In so doing, final design responsibility is effectively lifted from the contractor and returned to the government, and usually cost and delivery date are both extended.

A revision of this practice is worthy of the attention of the military department heads, to the extent that the contractor is required to deliver against specifications and use-requirements, but is given a resonable degree of latitude in production design details within the general specifications, and has final au-

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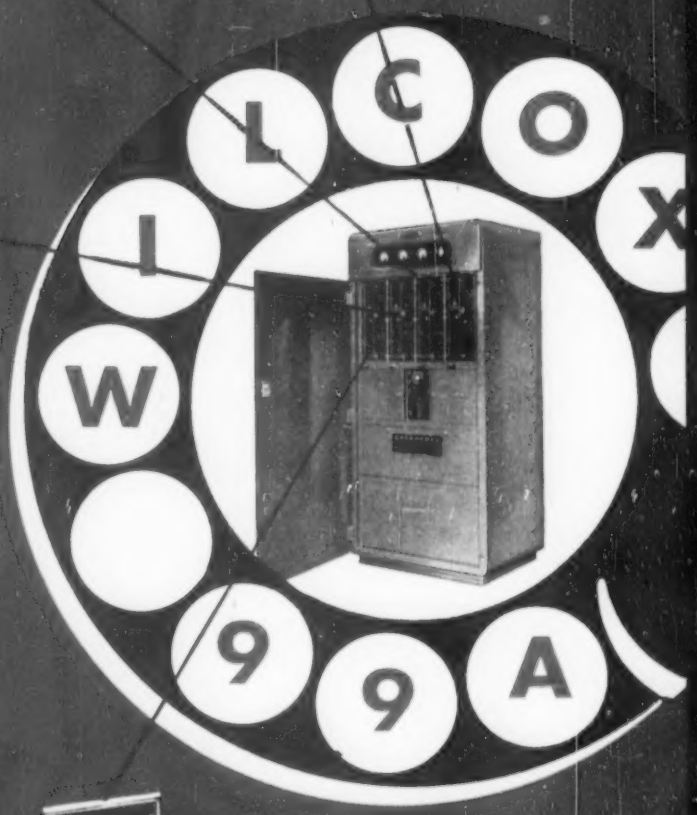

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thority and responsibility within these limits.

▶ **Another Headache**—There is still another difficulty inherent in the transition of military product designs from the research and development stage to the production design phase. Because there is seldom if ever sufficient time available completely to research a project before it has to be started off in production design, it is absolutely essential that an adequate R&D budget be provided for the necessary supporting development work during production design stages.

However, government accounting practices seldom recognize this necessity. Ordinarily, R&D funds are cut off when the production contract is placed, and the harassed contractor is faced with the problem of providing, somehow, the continuing development work to support his design group in such ways that he can get paid for it under the production contract.

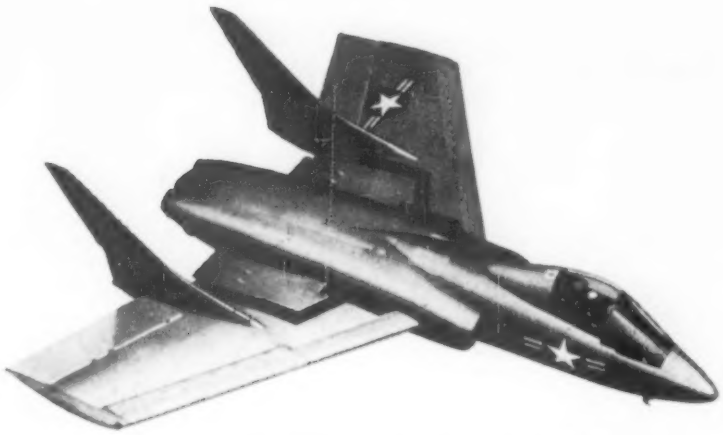
The government contracting officer in turn is charged with safeguarding his production funds, and alternately threatens to disallow the contractor's development costs or cancel the entire contract. In almost futile exasperation he usually invites the contractor to go back to the R&D people and negotiate a development contract if he can't figure out how to finish the job without so much experimentation and redesign work, but in any event to stop diverting production money to development.

Neither the contractor nor the contracting officer is at fault in this dilemma. The ground rules under which the money is handled are the source of the difficulty. Only a revision of these rules and their manner of application will correct the situation. The numbers of industrial organizations able and willing to work under difficulties and abuses of this nature are limited.

▶ **Recommendations**—Weapons of war have finally grown so complex that teams of research, development and design people, rather than individuals, are needed to bring into production the more advanced and complicated weapons and weapons systems. This is in sharp contrast to earlier weapons that could be and often were the expression of individual inventor-engineers.

The changes in management approach to the new concept may be pinpointed as follows:

- Wherever possible, the contractor should be given full responsibility from the start for all phases of the project—research, development, and production-design engineering, as well as production.
- When it is impossible or impractical to contract for the R&D portion of a project with the ultimate manufacturer, the remaining tasks of production design engineering and actual manufac-



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Chance-Vought Aircraft's twin-jet— F 7U-3 Cutlass is designed to out-fly or out-fight any other carrier-based fighter in the world.

To minimize the amount of time this fast fighter would spend on the deck for normal maintenance and service, Cutlass designers tripled the number of the aircraft's access doors and panels.

Because of their speed of operation, versatility and positive locking action, Chance-Vought engineers specified Camloc quarter-turn fasteners for over 100 of these doors and panels!

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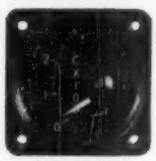
THERMOCOUPLE TYPE

All **LEWIS** thermocouple indicators are fully cold-end compensated, magnetically shielded and are available for use with iron-constantan, copper-constantan or chromel-alumel thermocouples in all standard ranges for the thermocouple material used. A few typical ranges are listed below.

MODEL 17B

MODEL 17B, 2⅛" case to AND 10401
—50 to +300°C Cylinder Temp. (AN 5536-1A or T1A)
—50 to +300°C Bearing Temp. . . .
0 to +1000°C Exhaust Temp.



MODEL 49B

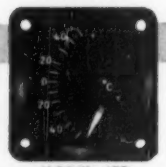
MODEL 49B, 1⅞" case to AND 10403
—50 to +300°C Cylinder Temp. . . .
0 to +1000°C Exhaust Temp.

MODEL 76B dual, 2¼" case to AND 10401
—50 to +300°C Cylinder Temp. (AN 5536-2A or T2A)
—50 to 300°C Bearing Temp. . . .
0 to +1000°C Exhaust Temp.

MODEL 76B

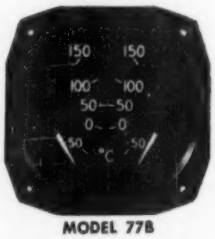
RESISTANCE TYPE

Accurate ratiometers, these **LEWIS** indicators are remarkably free of voltage error, have nearly linear scales (not crowded at the ends) and are magnetically shielded. A few typical ranges are given below. Not shown is Model 46B, 2¾" single.



MODEL 47B

MODEL 47B, 1⅞" case to AND 10403
—70 to +150°C AN 5790-6 or AN 5790T6
0 to +125°C Oil Temp. . . .
—50 to +50°C Air Temp.



MODEL 77B

MODEL 77B dual, 2¼" case to AND 10403
—70 to +150°C AN 5795-6 or AN 5795T6
+30 to +230°F Oil Temp. . . .
+100 to +300°C Cylinder Temp.

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ture must not be separated, but must be contracted for with a single responsible producer.

• When the decision is made to initiate production-design work, R&D personnel should be reduced in scope and authority to that of a consultant and advisory group. Only the production-design engineering department should then have authority over production design details. This rule should not be circumvented, either by the contractor or the contracting officer.

• Recognition is necessary of a continuing element of development engineering expense after a project is placed in production design status. Not only should there be a continuing activity in the R&D group in a consulting capacity, but the production-design engineering department must also carry on a reasonable amount of engineering development and experimentation for a satisfactory production design.

► **Place for Individuals**—It might be assumed that there is no longer a legitimate place in the weapons system concept for the individual inventor or the small organization so limited in scope that a large project cannot be undertaken. Nothing could be further from the facts.

There is no single industrial or government production organization in existence that can readily supply even a significant percentage of the individual parts and separate components that are required for a comprehensive weapon or weapons system. This is particularly true of those weapons systems that rely heavily upon electronics to accomplish their objectives.

Historically, production in the United States has been dependent upon the contributions of many individual specialist organizations for the necessary components and parts supply for devices with a degree of design complexity. There has been no detectable trend away from this basic practice, and no such departure is expected.

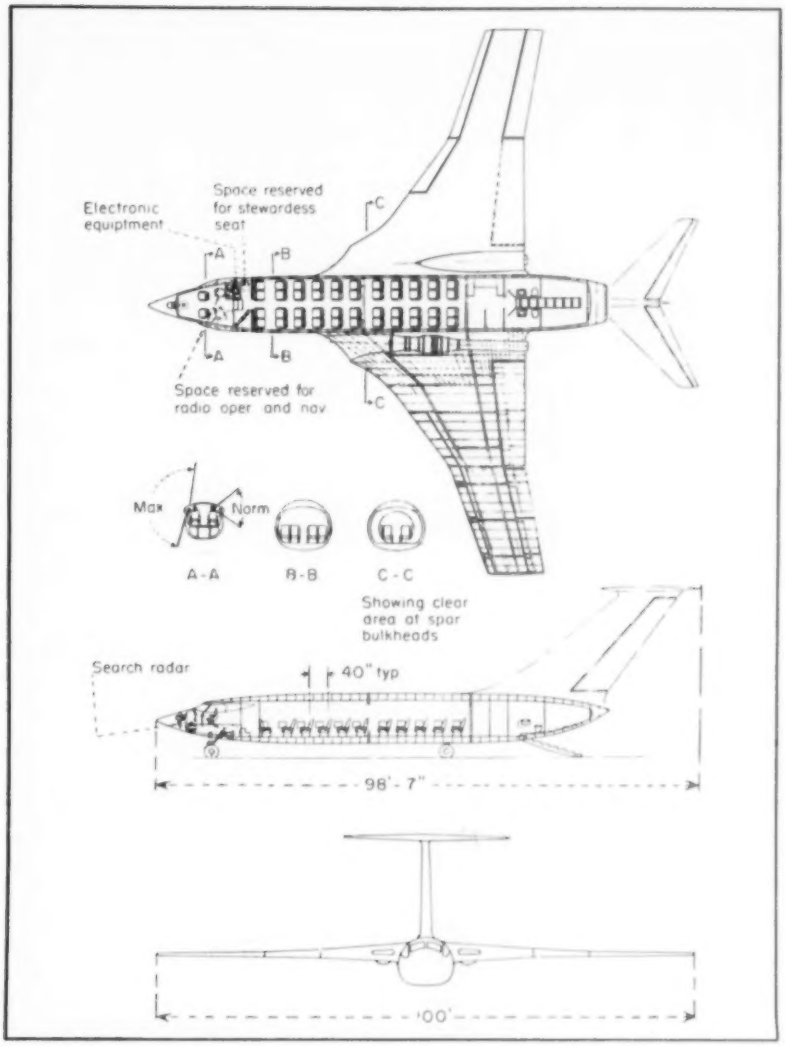
Without the continued effective cooperation of a multitude of small business organizations, big business could not successfully undertake weapons systems assignments.

18 Airlines Order U.K. Jet Transports

(McGraw-Hill World News)

London — British turbine-powered transports have been ordered by 18 airlines of 12 countries, Society of British Aircraft Constructors reports.

A total of 175 planes, valued at approximately $184.8 million plus spares, make up the orders. These include 54 de Havilland Comets, 84 Vickers Viscounts and 37 Bristol Britannias.



Details of Fairchild Jet Transport

M-168B would carry 44 passengers at 570 mph. over 1,500-mi. stage; estimated price: $1.7 million.

A "cusp" wing and a high-mounted, sweptback T-tail characterize the aerodynamic layout of Fairchild's new 44-passenger jet transport design study.

The unusual wing shape is described as a combination of the delta and straight planforms, and is not, says designer Walter Tydon, to be confused with the crescent hybrid of the swept-back and straight wings.

Tydon recently described the design features of the Fairchild Model M-186B to a press conference, shortly after a four-hour session with representatives of 12 domestic airlines (AVIATION WEEK Nov. 23, p. 20; picture, Nov. 30, p. 14).

▶ **Performance**—The Fairchild design proposal depicts a high-wing, twin-engine airplane capable of carrying 44 passengers over stage lengths of 1,500 mi. without refueling. Cruise speed is 570 mph. at an altitude of 46,000 ft.

The airplane grosses 75,770 lb. for normal passenger use. Its span is 100 ft., putting it in a class with most contemporary transports.

Powerplants are a pair of Wright J67 (TJ32C3) turbojets, rated at an expected minimum of 12,000-lb. sea-level static thrust.

Initial cost is estimated by Tydon at $1.7 million, assuming an order for 100 airplanes. Direct operating costs cited are 1.4 cents/passenger mile.

Major purpose of the airline presentation, according to Tydon, was to determine if the design was suitable for airline use. "We were looking for evaluation," said Tydon. "We designed what we thought was a good airliner and wanted to see if the airlines agreed."

Some of them didn't. Specific airline complaints included:

- **Low passenger capacity.** The operators said they would like space for 60 first-class travelers, with 80 carried in the high-density version.
- **High tail location.** The clearance required for the 31-ft.-high tail seemed to bother the airline personnel. Current typical heights: 24 to 29 ft.
- **Fuel and engine location.** The current layout has fuel space just outboard of the engines, and the airlines felt the two should be separated.

Incidentally, it should be noted that the airline people wanted increased capacity while still sticking with the twin-engine design of the same size and weight class.

▶ **Wing Layout**—Most striking feature of the Fairchild design is the "cusp" wing. Tydon explained that the design team took a standard delta planform, cut the tips off and added slightly swept extensions. The name for the wing came partly from a consideration of the geometry (a cusp is a curve with two coincident tangents) and partly from a consideration of the commercial appeal in a short, crisp designation.

Tydon said that the advantages of the delta—sufficient thickness to bury engines, fuel and landing gear; and large thickness for great strength—were retained. To them were added the advantages of a straight wing extension—increased span for increased range, more trailing edge for flaps and ailerons, and improved lowspeed stability.

Wing area is 2,000 sq. ft., not counting the deviation from the basic delta which occurs at the air intakes. Span is 100 ft. Slats are fitted to the outboard portions, split flaps to the inboard trailing edge.

Wing root thickness is 10%; tip thickness is 6%. Calculations made with normal gross weight and the stated stalling speed of 109 mph. give a value of 1.25 for the maximum lift coefficient.

Wing structure is conventional, with two spars, several heavy ribs and a multitude of stringers and light ribs. Wing carry-through structure is a pair of heavy rings.

▶ **Fuselage Full**—A glance at the sectional drawing shows that the fuselage is filled; there is very little waste space. Fuselage is of circular cross-section, fairing to a "beavertail" toward the end because of the rear loading ramp.

Structure is conventional ring-and-stringer layout. Wing carry-through rings provide a rear bulkhead which divides service space from the cabin, and a forward cabin divider, which

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Fairchild M-186B

DIMENSIONS

• Wingspan, ft.	100
• Overall length, ft.	98.58
• Overall height, ft.	31.75

WEIGHTS

• Normal gross weight, lb.	75,770
• Empty weight, lb.	44,000
• Max. takeoff gross weight, lb.	100,000
• Max. cargo load, lb.	35,000
• Internal fuel weight, lb.	22,000

PERFORMANCE

• Cruise speed, mph.	370
• Cruise altitude, ft.	46,000
• Single-engine cruise speed, mph.	350
• Stall speed, normal gross mph.	109
• Takeoff dist., 50-ft. obstacle, ft.	2,600
• Landing dist., 50-ft. obstacle, ft.	2,500*
• Landing dist., 50-ft. obstacle, ft.	1,400**
• Normal range, mi.	1,500
• Maximum range, mi.	2,500

* **Wheel brakes only for stopping.**
** **Wheel brakes plus reverse thrust for stopping.**

separates the passenger space into two sections of 24 and 20 seats.

Normal cabin head-height is 80 in., reduced to 72 at the dividing frame. Floor height is 48 in., the level of truck beds. This latter feature and the use of the beavertail door could make the M-186B readily convertible to bulk freight operation, Fairchild says. Cargo capacity would then be 2,700 cu. ft.

Normal crew is three, with additional space provision for navigator and radio operator. Cockpit windshield arrangement differs from the conventional by the addition of a bubble canopy at each side, somewhat similar to the "bugeye" arrangement used on the Douglas B-42 and C-74.

Normal passenger seating arrangement is two on each side of the aisle, with the first row of seats facing aft. Spacing is on 40-in. pitch. For coach services, the capacity would be increased to 64 seats.

▶**Details**—Landing gear of the craft features an unusual scheme for mounting three wheels side-by-side to reduce the tire footprint pressure.

Reverse-thrust scheme for the twin jet engines was shown by Tydon. It used a divided tailpipe closure which rotates to divert the exhaust blast outward and forward.

Extra fuel to increase the normal 1,500-mi. range is to be carried in external tanks protruding from the wing leading edge like those of the Comet 3.

Thrust lines of the jet engines diverge aft; tailpipe exit location is well aft of the rear row of seats to reduce

noise level in the cabin.

► **Questions**—Two points in connection with the basic design of the airplane are apparent on study of the three-view drawings:

• **Seat locations** of passengers and crew with respect to the airplane CG differ from contemporary practice to a considerable extent. The crew, for example, is about twice as far from the CG (45 ft.) in the Fairchild model as they are in the Convair 340 (23 ft.) or the Martin 2-0-2 (20 ft.). Farthest passenger seat location is 34 ft. from the CG compared to 25 ft. in the 340 and 20 ft. in the 2-0-2.

• **Horizontal tail size** seems small, and the moment arm is about two wing-mean-chord lengths.

The combination of these two factors—long moment arms to crew and passengers, short moment arms to horizontal tail—could mean some discomfort in rough weather, to a degree not reached currently in transports.

A Fairchild spokesman who was queried about these two points by an AVIATION WEEK reporter gave these answers:

• **Gust alleviators** may be the necessary solution to the rough-weather problem, and could limit angular accelerations on passengers and crew in turbulent air.

• **Horizontal tail area** was determined for conditions of trim and to get better landings; windtunnel tests may show the need for size changes.

► **Production**—Fairchild is looking to a useful life extending between 1958 and 1970 for the M-186B. The firm used specification values for the engine to calculate performance; but increased thrust and decreased fuel consumption are expected from the J67 engine by 1958.

This model is the second in Fairchild's civil jet transport design studies. The M-186A was a smaller type intended for cargo only; presumably there will shortly be a 186C incorporating as many of the airline recommendations as possible.

Fairchild is also proposing a turboprop military transport intended for use into and out of unimproved fields. Both projects are part of the company's $1.5-million research program announced last June.—David A. Anderton.

Oxygen Study Shift

Bendix Aviation Corp. will concentrate an important portion of its oxygen systems engineering work on high-altitude aircraft at the corporation's Pioneer-Central Division, Davenport, Ia. Approximately 10 engineers will be transferred from Eclipse-Pioneer Division, Teterboro, N. J. to Davenport and there are also openings for several new graduate engineers.

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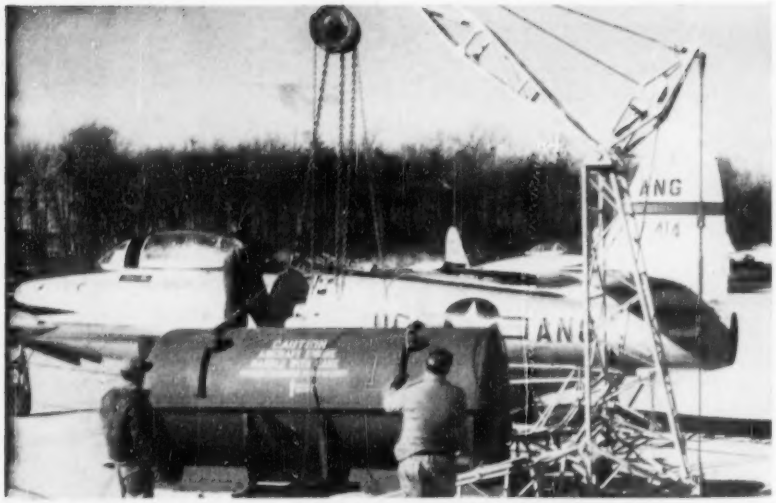


DIRECT TRANSFER of engine to aircraft in field is made from metal can. Hermetic sealing has prevented corrosion and eliminated need for special preparation or check.

Canning Engines Saves $9 Million

Use of metal cans for storing and preserving aircraft engines has saved the Air Force more than $9 million a year, Rheem Mfg. Co. states.

Rheem, which manufactures these engine cans, gives as its source for the claim an Air Materiel Command report that has been recently released. The AMC report recommends conversion to the metal containers, the Downey, Calif., manufacturer says.

► **BuAer Study**—The report cites a Navy Bureau of Aeronautics study of engine deterioration in woodbox storage.

After a six-month storage period, 801 piston engines showed a loss from corrosion amounting to more than $4 million—about $5,065 per engine. Minor repairs were necessary for 19 of the engines, 642 required major overhaul, and 140 had to be scrapped.

► **Cost Data**—Initial cost of the metal container frequently is lower than that of wood, Rheem quotes the report as saying. For example, price of the steel package for the R2800 engine is $20 less than that for a wood box, because the latter must include cost of a foil envelope, dehydrator plugs and other accessories.

In a table of comparative costs between the two types of containers for 12 different aircraft engines—both piston and jet—the AMC paper shows that metal containers cost less in five instances, cost the same in another five, and are higher in two of the cases.

Estimated conservatively, the life of the metal container is five times that of the wood box, and cost of maintaining the engine in its container is considerably less with the metal unit, Rheem reports.

► **Field Experience**—An experiment with 25 engines in metal packages held in storage in the open for a period of more than two years resulted in a finding of 100% engine serviceability.

BuAer tests indicate that such packaging protects over such a period even in tropical areas, the AMC report says. Engines so stored have to be checked only once a year, the desiccant changed and pressure adjusted every two years.

J35 and J47 jets in Rheem metal containers can be lowered overboard and floated ashore without damage during an amphibious operation, the company claims. About three years ago, when the Mississippi and Missouri rivers overflowed and St. Louis rail yards were under water, canned jet engines on flatcars survived with no harmful effect whatsoever, Rheem says.

► **Internal Provisions**—Both piston and jet engine containers have shock-mounting provisions for the powerplant. For example, the Rheem installation has been developed to insure against vibration in resonance with a railroad car, during shipment.

The container is hermetically sealed with a rubber gasket in a triangular groove between bolted flanges of the container's half-sections. The can also carries dehumidified air under light pressure, with a relief valve to release pressure if it builds up too high. The desiccant absorbs any inherent moisture in the container or equipment at the time of sealing.

► **Broad Coverage**—In addition to engine containers, Rheem is currently building or research-engineering special containers for guided missiles, Rato units, electronic instruments, and other equipment.

It also has developed a group of 28 reusable metal containers for shipment and long-term storage of jet engine spare components.

Compressors Spark British Jet Lead

More efficient compressors that result in more efficient jet engines and permit better overall design are the basis of the jet engine lead that Great Britain has over the U.S., says Dr. Owen A. Saunders, a British scientist. And Britain's designs are more advanced because that nation has worked in the jet field longer than the U.S., Saunders says.

In a recent lecture at Illinois Institute of Technology, Saunders pointed out that jet development in Britain has been the result of a "mixture of competition and collaboration" among firms conducting such research. This is done by a group known as the Air Gas Turbine Collaboration Committee, composed of representatives of British jet engine firms, which meets four times a year to compare jet research.

"There are a great many secrets, and things are undoubtedly held back, but the group provides a method of procurement not used in the United States," said Dr. Saunders.

He presented two lectures in the field of heat transfer, sponsored by the mechanical engineering department. Saunders is professor of mechanical engineering at the Imperial College of Science and Technology, University of London, and a member of the British Aeronautical Research council, as well as the gas turbine committee.

Magnesium Plate Supply to Grow

A new highspeed, high-production rolling mill for magnesium plate has been put into operation at Dow Chemical Co.'s Madison, Ill., division.

Reported to be the most powerful rolling unit ever constructed for magnesium, the machine is described as an 84-in. reversing breakdown coil mill. It is producing hot rolled plate 6 ft. wide in lengths up to 60 ft. from 2,000-lb. rolling ingots. Previous production has been on hand mills utilizing rolling ingots weighing up to 350 lb.

An 84-in. cold coil unit for finish rolling of thin-gage magnesium sheet is being installed for operation early in 1954, when the Madison rolling facility is expected to supply current military demands for plate and sheet, along with extra capacity for markets that previously have been restricted by shortages.

New British Anti-Sub Plane

The Short S.B. 6 Sea Mew is unique in two ways. It was the first of the current group of "stripped-down" airplane designs to be built and flown. It was the only completely new airplane at the 1953 SBAC display at Farnborough.

A single Armstrong Siddeley Mamba turboprop engine, operating on ship's diesel fuel instead of gasoline, powers the Sea Mew. Designed as a lightweight anti-submarine craft for operation off the light carriers of the NATO countries, the S.B. 6 has been ordered for the Royal Navy.

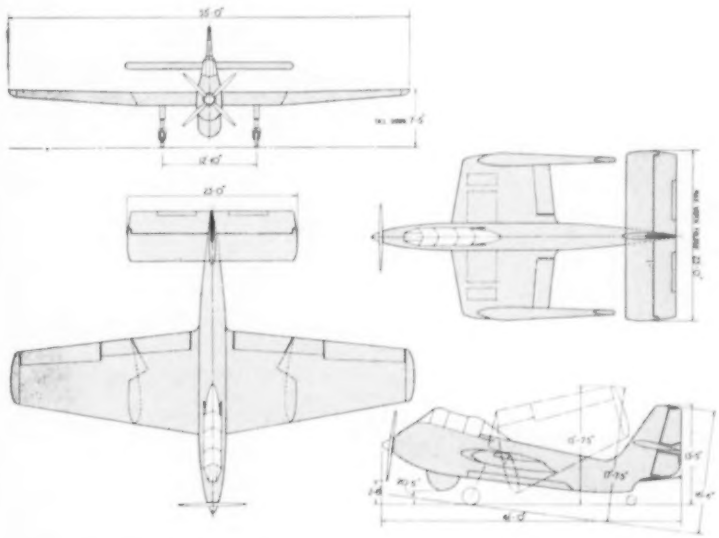
The formula is the general anti-submarine one: thick, large wing; crew mounted high with excellent visibility; rugged construction. But there are modifications: fixed landing gear; "cruiser" stern (which is the term used to describe the notched upsweep in the region of the arresting hook); and single power plant.

A detachable radome bolts onto the underside of the nose, as the three-view drawing shows.

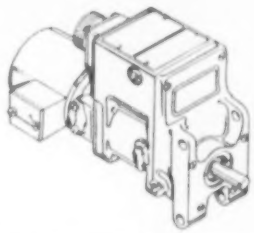
Weapons, probably including the same variety of guided torpedoes that the Fairey Gannet will carry, can be stowed inside the bomb bay.

The unusual scoop located under the leading edge of the horizontal tail was added after the airplane had made its early flight tests. The purpose is unexplained; but it may be there to channel air around the lower half of the split rudder for control at high angles of attack.

Some technical observers have criticized the Sea Mew, pointing out that for not much more money—$224,000 against $168,000—Gannets could be purchased, fully equipped and ready to go, with twin-engine layout and a three-man crew.



AIRBORNE ACTUATOR *for* *Navy's Guardian*



The ram air inlet door on this new Grumman sub-hunter is actuated by Airborne's R-412M5 Actuator. Other models and similar Airborne electromechanical units are standard equipment in many service and civilian aircraft. Their wide range of applications is evidence of their great dependability.

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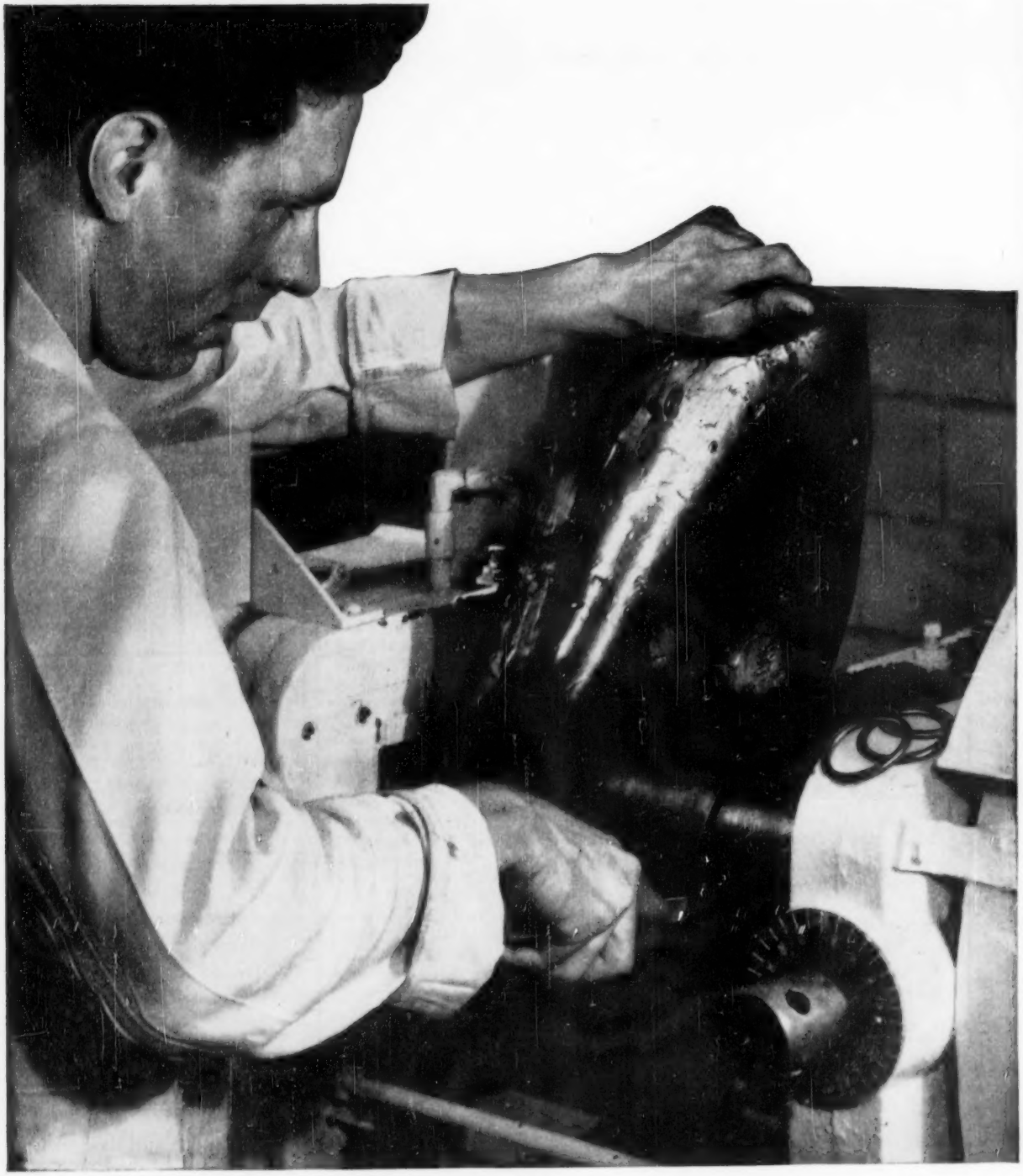

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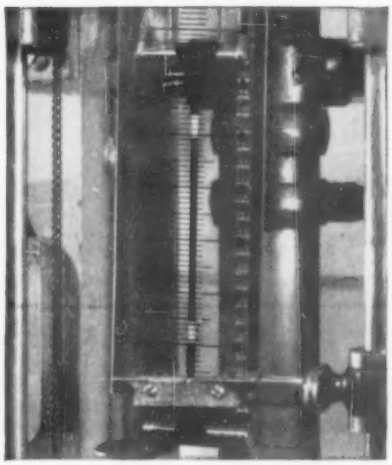
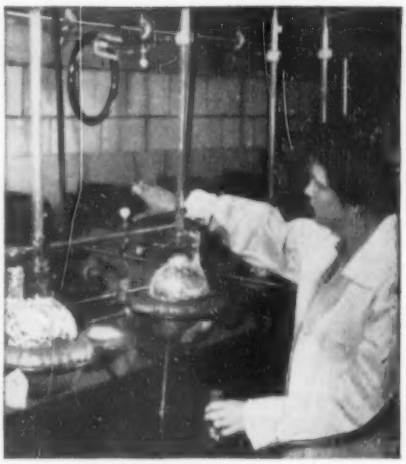


3. Elongation, being tested here, and maximum compression set are other vital factors that determine which compound will assure leakproof O-rings for your application.



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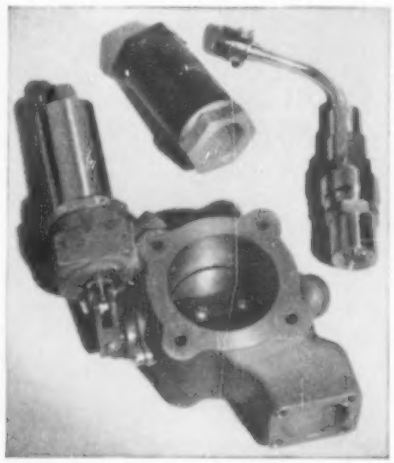

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Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Aerodex, Inc., P. O. Box 123, International Airport, Miami 48, Fla., services and material to overhaul pump assemblies, 1,000 ea., $106,000.

AiResearch Mfg. Co., div. of the Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, Calif., turbine assy. for various aircraft, 397 ea., $233,238.

Bendix Products Div., Bendix Aviation Corp., 401 Bendix Drive, South Bend 20, Ind., carburetor, 30 ea., $40,211; maintenance parts to support fuel controls, $30,551.

R. E. Darling Co., 6825 Reed St., Bethesda, Washington 14, D. C., disconnect, 662 ea., $34,212; tube and disconnect assys., $27,829.

G & M Equipment Co., Inc., 7315 Varna Ave., North Hollywood, Calif., radar test set, 37 ea., $35,625.

Garner Instrument Co., Stinson Field, Hangar #6, San Antonio, Tex., services and materials to overhaul indicators, 611 ea., $58,503.

Scintilla Magneto Div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., items for magneto, harness lead and coil assys., $710,360.

United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn., pump assembly, 1,223 ea., $104,016.

United Aircraft Corp., Pratt & Whitney Aircraft Div., East Hartford 8, Conn., fuel pump, 20 ea., $32,160; spare parts for support of P&W engines, $67,876; crankcase, 47 ea., $27,457; spare parts for use on J57-P1 engines, $37,037; bearing for P&W engines, 1,784 ea., $146,395; crankcase, 90 ea., $52,578; spare parts for use on P&W engines, $842,082; services and material to overhaul P&W engines, $521,-100.

Douglas Aircraft Co., 827 Lapham St., El Segundo, Calif., maintenance parts for AD aircraft, $383,336.

Minneapolis-Honeywell Regulator Co., 2600 Ridgway Rd., Minneapolis 13, Minn., amplifier assy. used on unit tank, 682 ea., $35,086.

New York Air Brake Co., 230 Park Ave., New York 17, N. Y., hydraulic pumps for various aircraft, 164 ea., $126,870.

Vickers, Inc., 1400 Oakman Blvd., Detroit 32, Mich., hydraulic pump for R6D-1 aircraft, $270,249; hydraulic pump assy., 101 ea., $58,330; pump and motor assys. for various aircraft, $106,031.

Wallace & Tiernan Co., Inc., 25 Main St., Belleville 9, N. J., flasher, 193 ea., $28,-584.

Westinghouse Electric Corp., Aviation Gas Turbine Div., Lester Branch Post Office, Philadelphia 13, Pa., maintenance parts required to support J34-WE34/36/42 engines, $148,620.

Reynolds Metals Co., 2500 South Third St., Louisville 1, Ky., aluminum alloy, $52,-269.

Ruland Mfg. Co., 380 Pleasant St., Watertown 72, Mass., valve, air, high-pressure, for various aircraft, 15,600 ea., $33,540.

Stratos Div., Fairchild Engine & Airplane Corp., Bayshore, L. I., N. Y., services and material to overhaul cooling packages, $188,778; valve assy., 171 ea., $118,845.

Thomas Taylor & Sons, 50 Houghton St., Hudson, Mass., cord for various aircraft, 59,750 ft., $27,020.

Vickers Inc., 1400 Oakman Blvd., Detroit 32, Mich., valves, hydraulic, $37,970.

Wm. R. Whittaker Co. Ltd., 915 North Citrus Ave., Los Angeles, Calif., valve assy., 434 ea., $33,241.

Adel Div., General Metals Corp., 10777 Van Owen St., Burbank, Calif., valves, $25,-066; valves, hydraulic, $52,776.

French Mfg. Co., 15 Union St., Worcester 8, Mass., container for parachute kits, 3,395 ea., $25,598.

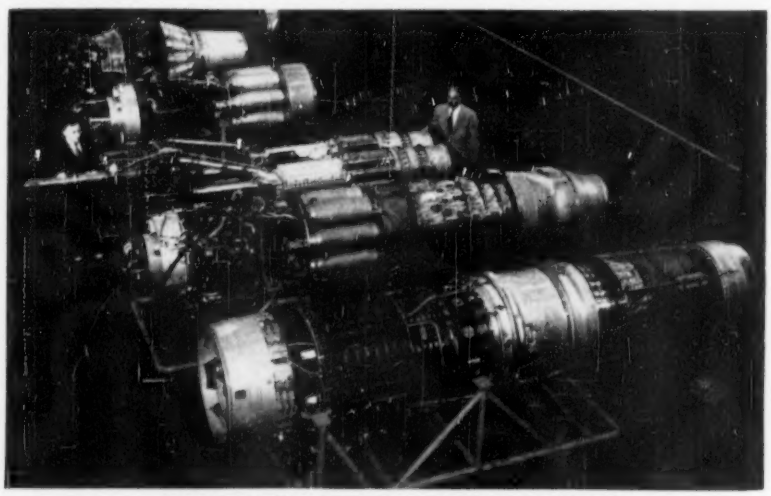
Keystone Watch Case Div., Riverside Metal Co., 1 Pavilion Ave., Riverside, N. J., various type indicators, 2,434 ea., $41,564.

Koehler Aircraft Products Co., Inc., 514 Vermont Ave., Dayton 4, Ohio, valve assys., $35,876.

Manning, Maxwell & Moore, Inc., 250 E. Main St., Stratford, Conn., gage for various aircraft, 453 ea., $33,036.

Skarda, Inc., 2549 N. Seaman Ave., El Monte, Calif., cylinder pivot, $26,716.

Surface Combustion Corp., 2375 Door St., Toledo 1, Ohio, heater equipment, $29,966; heater components for various aircraft, 119 ea., $27,313.



PORTRAIT OF ALLISON JET FAMILY

Group photo shows the five different jet engine models now being produced by Allison Div. of General Motors Corp. These engines have a background of more than 3 million flying hours, the company says. From front to rear: J71, which is said to be the most powerful turbojet without afterburner in production in the U. S.; J35 with afterburner, as fitted to the Northrop F-89 Scorpion; the T40 dual turboprop used on the Convair R3Y Tradewind; the J35-A-29 for the Republic F-84G Thunderjet; and the J33, used on the Lockheed T-33 and Grumman F9F-7 Cougar. With the powerplants, left to right, are: Harold H. Dice, Allison assistant general manager; J. C. Cunningham, manufacturing manager and R. M. Hazen, director of engineering.

New Coupler Expands Autopilot Utility

• Sperry RBC ties plane tighter to ILS glide slope beam and flies omniranges with improved stability.

By Philip Klass

United Air Lines' new DC-7s, which go into service next spring, will be equipped soon thereafter to fly the Victor (omnirange) airways automatically using a new Sperry Gyroscope Co. radio beam coupler developed for operation with commercial and military autopilots. The new coupler also offers more automatic features and improved performance during ILS instrument approaches.

The new name, radio beam coupler, which replaces the older terminology of approach coupler, reflects some of the device's increased capabilities. For example, the RBC's ability to fly the omniranges with good stability could result in a 50-fold greater use-factor than its predecessor. Previous automatic pilot couplers have generally been used only during instrument approaches, which represent a small percentage of an airliner's total flying time.

▶ **A-12 Descendant**—United's RBCs will be modified versions of the recently announced coupler developed for the Air Force (AVIATION WEEK Sept. 14, p. 119), presumably for use on the B-52 which will be equipped with a Sperry automatic pilot. Both versions are descendants of the commercial A-12 approach coupler which in turn stems from military parentage.

Automatic flight, approach, and eventually automatic landing, are long-cherished goals at Sperry. When military programs end or military development funds run out, Sperry keeps its automatic flight program going with its own funds, according to P. Halpert, head of the flight control engineering group. For this reason it is difficult to call the new RBC either a military or a commercial development.

▶ **Easing Pilot's Task**—Sperry has tried to ease the task of the busy flight crew during an instrument approach by building more automaticity into its radio beam coupler. For example:

• **Turn onto localizer** is made automatically as soon as the plane enters the beam. In older couplers, pilot had to watch ILS panel indicator and throw a switch when plane started to enter the beam. If pilot was late in throwing switch, the plane might have difficulty in getting centered on the beam in time.

• **Nose down onto glide slope** is made automatically when plane intersects the glide slope (if the pilot wants to use this feature) thereby freeing the pilot from watching the ILS indicator in order to throw a switch when the beam is intersected.

▶ **More Precise Approaches**—Halpert puts much more emphasis on the RBC's increased stability and precision in flying down the ILS glide slope and localizer beams than he does on the unit's increased automaticity. Halpert says the new coupler has a margin of stability which is "two to three times greater" than its predecessor's. This is based on several hundred hours of flight testing in a B-26 at Sperry's MacArthur Field, Long Island.

As dramatic proof, Halpert reports that during an instrument approach, when the plane is only 200 feet off the ground, its control column can be suddenly pulled back until the ILS needle shows full deflection, then released, and the plane will quickly settle back on the glide slope beam and follow it down.

LT. GEN. D. L. PUTT, ARDC Commander, explains operation of new radio beam coupler to USAF Secretary Harold Talbott, while Lt. Gen. E. W. Rawlings, AMC chief, looks on. Occasion was recent air show at Dayton.

SPERRY RBC is designed to fly VOR airways as well as make improved ILS approaches, all with more automaticity than its predecessor.

Sperry views the tighter coupling of the airplane to the ILS beams, particularly the glide slope, as a step toward automatic landing because it eases the task of the flare-out adaptor. The Air Force, which has a need for automatic landing, has several automatic flare-out systems under development.

▶ **Flying the Omnirange**—The apparent similarity of the omnirange beam to the ILS localizer led some to believe that the early approach couplers could be used without modification to fly the VOR airways. Further investigation and experience showed otherwise.

For example, the localizer beam is used over a distance of 15-20 miles, whereas the VOR beam may be used for distances up to 200 miles. Because the beams are fan-shaped, there will be a corresponding 10-12 to 1 greater variation in signal gradient (millivolts per foot displacement from beam center) when flying the omnirange.

If the coupler sensitivity is set to provide tight control near the VOR station, it will tend to be "sloppy" at long distances. If designed to give tight control at long distances, the coupler may over-control and give a rough ride at short distances.

▶ **Heading Signal Added**—To provide suitable stability along the entire usable VOR beam length, Sperry's RBC uses

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RECEIVER SPECIFICATIONS

FREQUENCY RANGE: 118 mc to 136 mc (by changing one fixed capacitor frequency range can be increased to 152 mc.)

SENSITIVITY: Less than 2.5 hard microvolts is required for 6db S+N/N ratio with 30% modulation at 100 cps.

FREQUENCY STABILITY: 0.005% from -25°C to +55°C.

BANDWIDTH: ±20 kc at -6db attentuation
±45 kc at -100db attentuation

SPURIOUS RESPONSE: Greater than -90db.

AUDIO RESPONSE: Less than 3db variation from 300 to 3500 cps.

AVC CHARACTERISTICS: 3db variation with input varied from 5 to 100,000 microvolts for one watt output.

NOISE LIMITER: Audio output variation not more than 2db from 70% modulation to 100% modulation.

SQUELCH: Range 0 to 50 microvolts. On-off differential at 2 microvolts input level, 0.3 microvolts.

TEMPERATURE RANGE: -25°C to +55°C.

HUMIDITY RANGE: 0 to 95% at 50°C.

PRIMARY POWER: 117 volts, 50/60-cycles ac, approximately 85 volt-amperes.

AUDIO OUTPUT IMPEDANCE: 600-150-4 ohms.

R-F INPUT IMPEDANCE: 52-ohm coaxial with maximum standing wave ratio of 2 to 1 from 118 to 136 mc.

TRANSMITTER SPECIFICATIONS

FREQUENCY RANGE: 108 mc to 136 mc.

POWER OUTPUT: 50 watts unmodulated.

EMISSION: A3 (A.M. Telephony)

OUTPUT CIRCUIT: To feed 52 ohm coaxial cable. Complete with antenna co-ax relay (send/rec.) installed.

MODULATION CAPABILITY: 95% at 1000 cps.

NUMBER OF CHANNELS: One. Can add crystal relay to give two channel operation. Second channel less than 800 kc away.

FREQUENCY STABILITY: 0.005% from -25°C to +55°C.

AUDIO INPUT: 500 ohm center tap or carbon mic. Minimum level approximately -15db into 500-ohm input.

AUDIO RESPONSE: Within 6db from 300 to 4000 cycles.

DISTORTION: 10% maximum at 95% modulation level (1000 cycles.)

NOISE LEVEL: 40db below 95% modulation with 60-cycle supply.

INPUT POWER: 117 volts, 50/60-cycles ac.

STANDBY: 80 watts.

FULL OUTPUT
(95% modulation): 380 watts.

TEMPERATURE RANGE: With 866 mercury tubes 20°C to 55°C.
With 3B25 gas tubes -25°C to +55°C.

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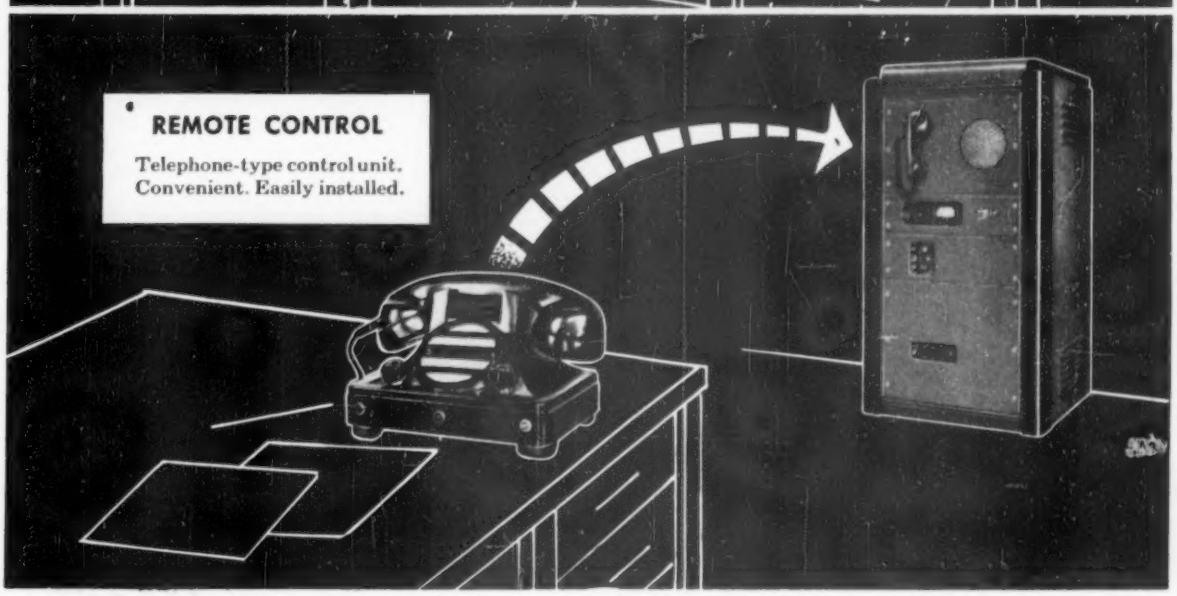

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a magnetic heading signal in combination with the VOR beam signal. The heading signal plays a predominant role at longer distances from the VOR station; the beam signal at shorter distances. The ratio of beam signal to heading signal used can be adjusted and will depend on the plane's normal cruising speed.

When heading and beam signals are used in combination, any crab angle which the airplane takes up to compensate for cross winds would normally cause it to fly slightly off the center of the beam. To prevent this, Sperry's RBC contains a small motor which functions as an integrator to "wash out" any steady-state VOR beam signal, enabling the plane to fly down the beam center despite its crab angle.

RBC circuitry is designed so that the integrator is not activated until the airplane is near the center of the beam and the plane has little or no bank angle.

▶ **Coasting Through**—Another significant difference between flying localizer and omnirange beams is that the plane must fly over and beyond the VOR stations. In doing so, it passes through what is often called "the zone of confusion," where the VOR signal becomes extremely erratic.

When the human pilot encounters the zone of confusion, he normally abandons his VOR indicator for a few moments and "coasts through" by flying on magnetic heading, until a usable VOR signal returns. Sperry's new RBC reacts the same way. How this is accomplished, Sperry is keeping under wraps until it gets patent coverage.

The automatic cut-off also functions in the event that the plane encounters a "noisy" portion of the VOR beam, according to George Jude, RBC project engineer.

▶ **Better Signal**—No small part of the improved coupler performance on localizer and VOR is attributed by Jude to the better lateral beam signal obtained through the use of a "lateral follow-up."

Instead of using the raw d.c. localizer or VOR signal directly, Sperry employs a small servo system to null out these signals and to generate a proportional a.c. signal. This not only provides a much cleaner signal, Sperry says, but also makes the plane less sensitive to tiny ripples in the radio beams.

The lateral follow-up consists of a small two-phase a.c. motor and tachometer driving two potentiometers, and associated servo amplifier. One of the pots is d.c.-excited to cancel out the incoming beam signal; the other is a.c.-excited and provides a proportional a.c. signal. The tachometer provides a signal proportional to rate of change of lateral beam signal.

▶ **Approach Configuration**—When the

coupler is used for ILS approaches, magnetic heading is not used, allowing the plane to take up any heading required to remain on the localizer. This eliminates the need for the integrator in the lateral channel and it is used instead in the pitch (glide slope) channel. This enables the plane to hold on the glide slope despite changes in airspeed or aircraft configuration.

The integrator also make it unnecessary for the pilot to set in a 3-deg. pitch-down attitude on the autopilot console controller, as required in the A-12 coupler.

▶ **Smooth Transition**—The use of automatic switching to take the autopilot off constant barometric altitude control and start the plane down the glide slope when the beam is intersected, gives a "very smooth transition," Halpert says.

The circuits are interlocked to prevent the switchover in the event that the glide slope warning flag on the ILS indicator is down, indicating failure of the glide slope receiver or ground station. Similar interlock circuits are tied into the VOR/localizer flag alarm circuit.

Like its predecessor, the output of the radio beam coupler can be set to limit the maximum airplane pitch or bank angle to any desired values. The new coupler weighs 14½ lb., approximately 2 lb. more than the A-12 approach coupler, but is slightly smaller in volume (545 cu. in. vs. 610 cu. in.).

The new coupler uses 13 vacuum tubes, compared to eight for the older model.

Avionics Engineers Get New Lab Tools

A variety of devices for use in test and measurement in the avionics development lab has recently been announced. The list includes:

• **Phase angle detector,** Type 205, will measure phase angle with an error of less than 0.1 deg. over the range of 10 kc. to 10 mc., according to manufacturer. Lower frequency limit can be extended to 1 kc. with an additional delay line, and upper limit can be extended at expense of accuracy. Advance Electronics Co., Inc., Passaic, N. J.

• **VSWR meter,** Model 136A, for measuring reflection coefficient, is continuously tunable between 92 and 355 mc. Reflection coefficient and VSWR can be read directly from front dial. **Wideband directional couplers,** for power, impedance, or matching measurements in the frequency range of 30 to 1,500 mc., are small and low cost. Units are available in four models with different coupling factors and impedance. Sierra Electronics Corp., 1050 Brittan Ave., San Carlos, Calif.

• **Precision phase shifter,** Type 704-A, for altering phase of sine wave input between 0 and 360 deg. without disturbing amplitude or waveform. Incremental phase shifts as small as 0.1 deg. can be made, and absolute accuracy is within 1 deg., providing signal frequency is held within 0.2%, manufacturer reports. Standard instruments are available for signal frequencies of 60, 400, 1,000 and 20,000 cps. and for any other frequency in this range on special order. Technology Instrument Corp., Acton, Mass.

• **Q-meter,** Type 260-A, covers frequency range of 50 kc. to 50 mc., permits Q readings down to a value of 10. A delta-Q scale gives difference in Q between two circuits over 0.125 range. Boonton Radio Corp., Boonton, N. J.

• **Incremental inductance bridge,** Type 1002-A, can measure inductances in the range of 1-200 henries within 3% accuracy, manufacturer says. Device is self-contained, including small cathode-ray tube indicator. Waters Manufacturing, Inc., 4 Gordon St., Waltham, Mass.

• **Megohmmeter,** Model 5G-1000, can measure insulation resistances to 1,000 megohms, operates from 500 volts, self-powered, and meets MIL-M-15023, according to manufacturer. Winslow Co., Inc., 9 Liberty St., Newark, N. J.

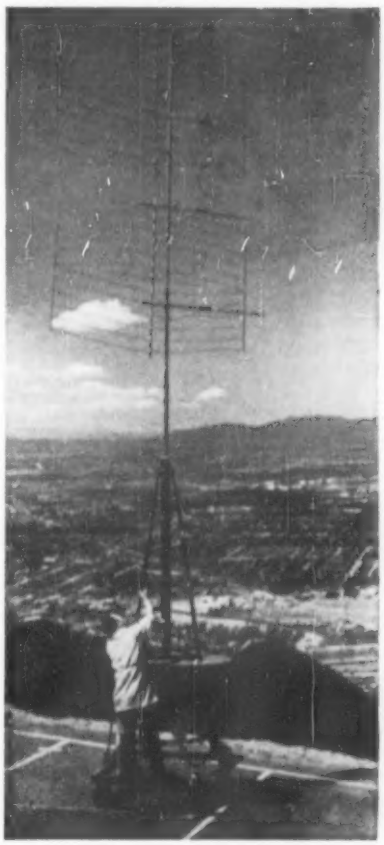
FILTER CENTER

▶ **New AEEC Secretary**—S. B. (Sig) Poritzky, formerly in charge of Civil Aeronautics Administration's DME (distance measuring equipment) activities, has joined the staff of Aeronautical Radio, Inc., and will serve as secretary of the Airlines Electronic Engineering Committee. Prior to joining CAA, Poritzky was with Trans World Airlines and McDonnell Aircraft Corp.

▶ **Waveguide Handbook**—"Microwave Nomograms and Charts" is the title of a new 20-page handbook of waveguide engineering application data published by Airtron, Inc. Write Airtron, Dept. H., Linden, N. J.

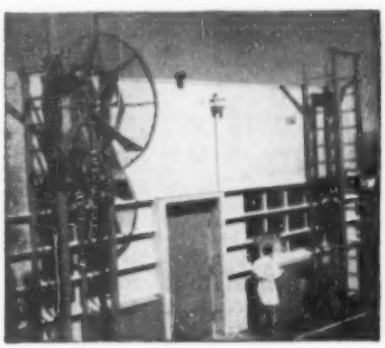
▶ **New Glide Slope Test Set**—A completely self-contained signal generator for testing ILS glide slope receivers has been announced by Boonton Radio Corp., Boonton, N. J. Designated the Type 232-A Glide Slope Signal Generator, the device permits accurate receiver alignment and calibration, company says. —PK

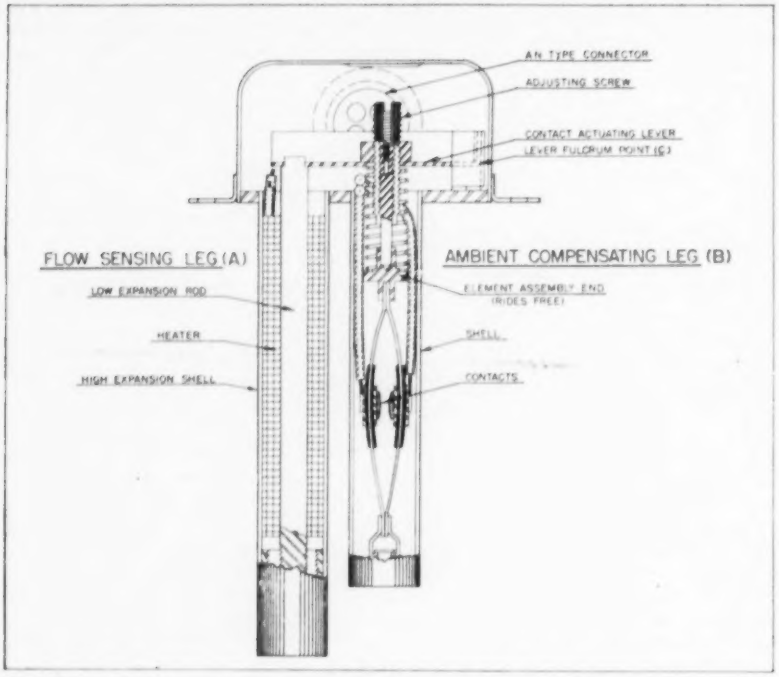
Stanford Expands MW Facilities

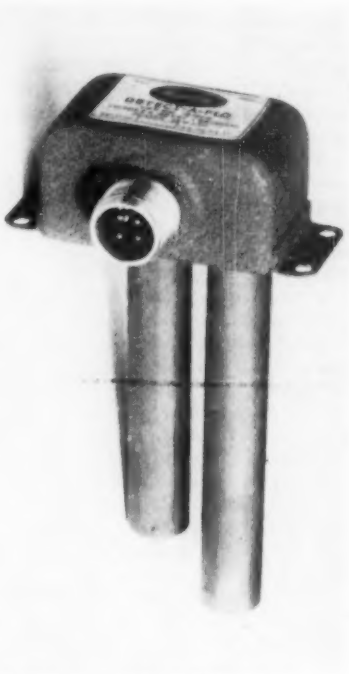


Stanford Research Institute, Palo Alto, Calif., has moved to expand its activities and services to the aircraft industry in Southern California by acquiring the staff and facilities of Microwave Engineering Co., located atop Mount Lee in the Hollywood district. Like SRI, Microwave Engineering has been active in antenna and microwave research, including radomes, since the company was formed in 1951.

The new facility, to be known as SRI's Mount Lee Laboratory, is located 1,700 feet above the surrounding countryside, making it an ideal location for antenna radiation studies. The lab will be part of SRI's Radio Systems Laboratory and will be headed by Robert Krausz, former chief engineer of Microwave Engineering Co.







DETECT-A-FLOW unit for control or detection of airflow or liquid level is based on Thermoswitch response to heat dissipation.

Sensor Controls Airflow, Liquid Level

By George L. Christian

Ashland, Mass.—A new double-purpose detection and control unit has been put on the aviation market by Fenwal, Inc., designers and manufacturers of aircraft and industrial fire detection and control equipment.

The new device, labeled Detect-A-Flow, is an adaptation of the basic Thermoswitch, Fenwal's thermal-responsive control in which the activating element is the single-metal shell, which expands or contracts with temperature changes to make or break electrical contact.

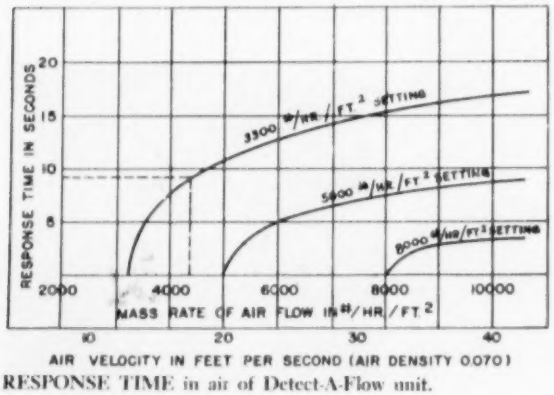
▶**Airflow and Liquid Level**—The Detect-A-Flow is designed essentially for two applications: detection or control of mass airflow and of liquid level.

Although the sensor unit has just been put on the market, it has been field-tested for over a year as an airflow detector in the heater circuit of Fairchild C-119Hs. Fenwal worked out the installation in cooperation with Surface Combustion Corp., makers of the heater and says all reports about the installation to date have been very satisfactory.

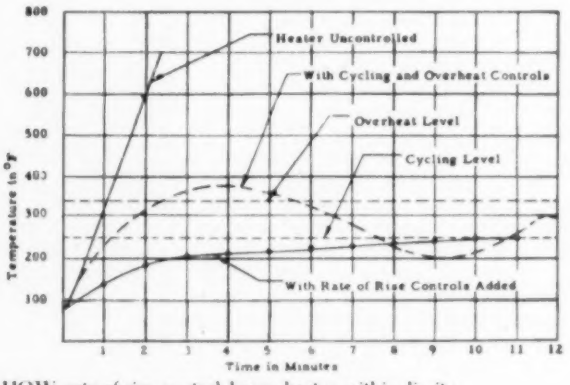
The Detect-A-Flo was initially designed for low airflow applications, as in combustion heater ducts, to detect such events as sudden blocking of ventilating air which would result in rapid temperature rises and very possibly fire. Ventilation air blockage may be caused by icing in the ducts, birds or other large objects being ingested during operation, etc.

▶**Good Points**—Fenwal spokesmen say their basic detection unit is so sensitive that contacts can be made to make or break in a few seconds by simply clasping the barrel in the palm of one's hand, then releasing it.

Control is small—a little over 5 in. long, almost 3 in. wide and 2 in. deep,



RESPONSE TIME in air of Detect-A-Flow unit.



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The only exhaust system manufacturer who also designs, builds and flies high-performance aircraft, Ryan leads the world in this specialized field. And because Ryan is *specialized, ingenious* and *versatile* it has been able to call upon its vast store of 31 years of experience in many related fields of aviation to serve all its customers better in their special requirements.

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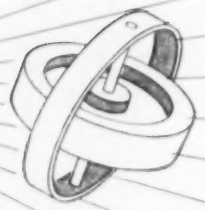

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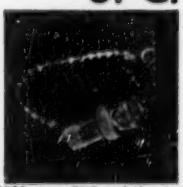

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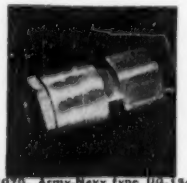

AI-11070, Army-Navy type UG-154/U, type LC plug for use with RG-17, 18/U cables. Weatherproof. Silicon rubber gaskets.

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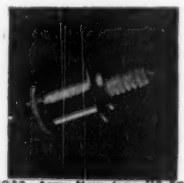
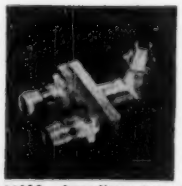


AI-11032, Army-Navy type UG-37A/U, high voltage pulse receptacle pressurized. Ceramic insert, neoprene rubber gaskets.

AI-11033, special type BNC high voltage plug. Mates only with high voltage receptacles and jacks, for use with RG-58/U cable. Weatherproof. Teflon insert. Neoprene rubber gaskets.



AI-11006, Army-Navy type UG-185/U Klystron Coupler. Weatherproof. Styrene Copolymer and linen base bakelite inserts. For use with Klystron tube 726C.

AI-11030, Army-Navy type UG-306/U, type BNC right angle adapter. One male, one female end. Weatherproof. Teflon inserts. Neoprene rubber gasket.

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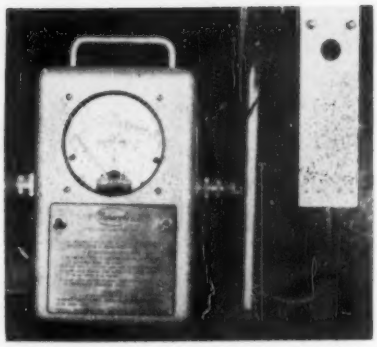

FIELD temperature test kit developed for UAL is now available to others.

including the ¾ in. AN connector projection. It weighs 7½ oz.

The unit is hermetically sealed, is highly resistant to vibration, corrosion and humidity. It is rugged, has no moving parts, is easy to install and requires little if any maintenance, Fenwal says. It will operate circuit breakers, fuel shut-off valves, solenoids, warning lights or other devices directly without having to go through relays or amplifiers.

▶ **What It Is**—The single-unit Detect-A-Flo is made up of three components:

• **Flow-sensing leg (A).** Made up concentrically of a high expansion shell, a woven type heater and a low expansion rod, the component senses rate of heat dissipation (see sketch, p. 50).

• **Ambient-compensating leg (B).** Consists of a shell, two strut-supported contacts (either inverse or regular) and an element assembly end which rides free in the upper part of the shell.

• **Control base.** Within the base, which supports both flow-sensing and ambient-compensating legs, are the contact actuating lever and the lever fulcrum point (C). Also within the base is an adjusting screw, mounted on the contact actuatiag lever. An AN-type connector is provided on the outside of the base. Through this connector passes the current to warm the heater and to energize the contact points.

▶ **What It Does**—The Detect-A-Flo senses mass airflow through the rate of heat dissipation from a fixed heat source which is self-contained in the control. If rate of heat dissipation is greater than

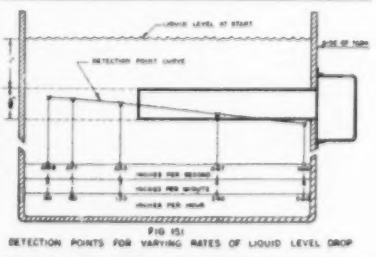

FIG 9S1

DETECTION POINTS FOR VARYING RATES OF LIQUID LEVEL DROP

EXPOSURE to air actuates Detect-A-Flow when used as liquid level control.

that for which the unit has been set, the contacts will be closed. If rate of dissipation is less than that the unit has been set for, the contacts will open (inverse contact arrangement). The unit can also be made with the opposite (regular) contact arrangement.

Changes in ambient air temperature have no effect on the unit, it being specially compensated to avoid such reaction, Fenwal says.

If ambient air temperature rises, flow-sensing leg (A) expands, tending to lower contact actuating lever, turning around lever fulcrum point (C). However, ambient-compensating leg (B) also expands with the temperature rise, exactly canceling movement of flow-sensing leg. Net effect is merely to lower the entire element assembly without affecting the bow of the contact struts within the element assembly.

▶ **How It Works**—The fixed heat source within the flow-sensing leg makes for relatively rapid shell expansion and simultaneously slower center rod expansion. Expansion rates differ because of different coefficients of expansion of the shell and rod metals.

Since the shell expands (in effect lengthens) more rapidly than the rod, the net effect is to lower the end of the contact actuating lever around lever fulcrum point (C). This will move the element assembly end downward, compressing the contact support struts, causing the contacts to open.

Air passing across the flow-sensing leg dissipates a certain amount of the heat in the shell, causing it to contract, reversing the above movements, and causing the contact points to approach each other. If heat dissipation is great enough, contact points will close. When airflow past the control drops below the value for which the unit has been set, leg (A) expands and opens the contacts.

The control can be factory-preset to accommodate airflows ranging from 200 to 10,000 lb./hr./ft.².

▶ **Fast Response**—Here is an example of Detect-A-Flo's rate of response: if the control is set at 3,300 lb./hr./ft.² and normal flow of 4,200 lb. is suddenly stopped, the device will operate in eight seconds.

In addition to aircraft combustion heater circuits, the control has been suggested for applications in engine test cells where change in airflow rates are important.

In some applications, it may be desirable to set the control for velocity or volume of airflows, which can be readily done. Fenwal says that when such settings are desired, nominal atmospheric pressure and temperature should be specified; otherwise these will be assumed to be standard or 29.92 in. Hg at 68F.

▶ **Liquid Level Detection**—As a liquid

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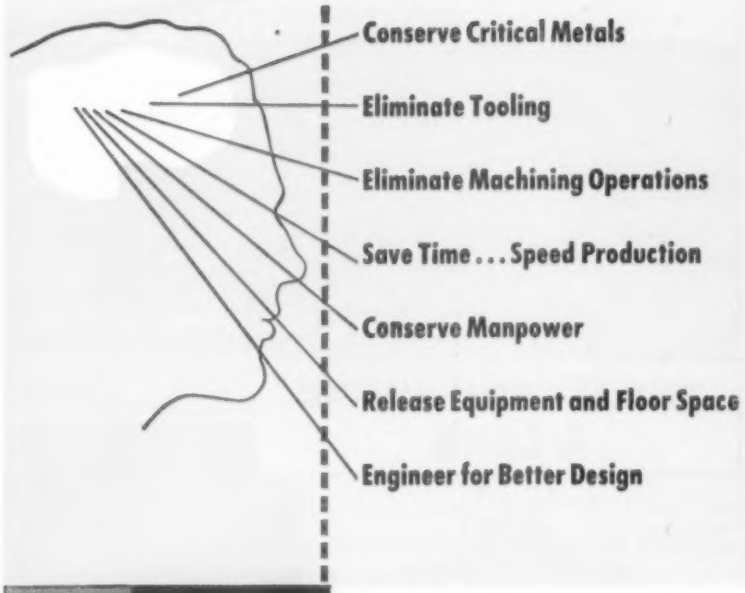

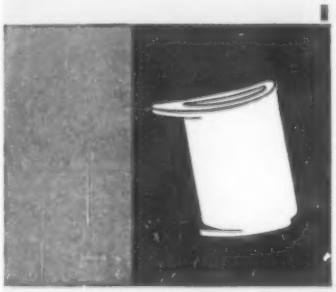

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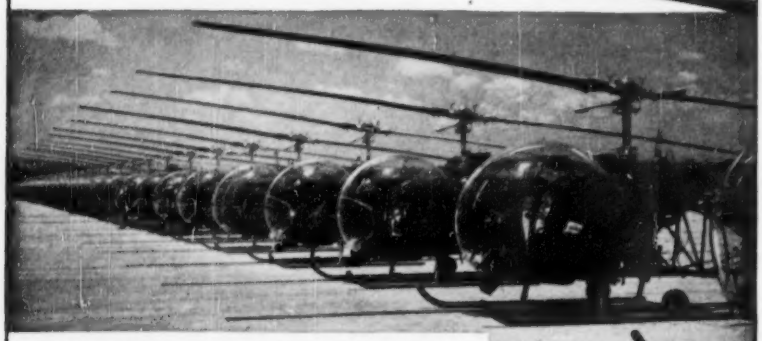
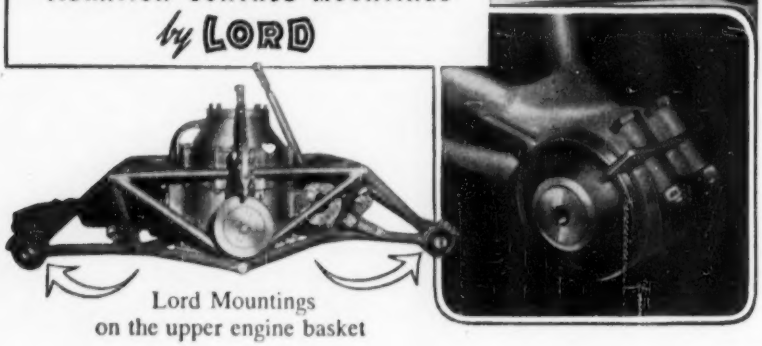


VIBRATION CONTROL MOUNTINGS
by LORD



Lord Mountings
on the upper engine basket

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level detector or control, Detect-A-Flo may be mounted in a tank with legs parallel to the surface of the liquid. The unit will operate rapidly if liquid level falls to expose the legs of the control to air.

In this application, Detect-A-Flo still operates on the heat-dissipation principle. Liquids are good heat dissipators while air is poor. As long as the legs remain submerged in the liquid, its good heat dissipation characteristics keep the instrument set in its desired position. Shortly after it is exposed to air, device gives warning.

The unit may be used to operate visual and/or audible signals, trip circuit breakers or open or close solenoid motor-drive valves, relays and the like.

▶ **Laboratory Test**—In laboratory tests of Detect-A-Flo as a liquid-level control at rates of 15, 30, 45 and 60 inches per hour change in level, the level was maintained with 3/32 of an inch in all cases, Fenway says.

Other aspects of Detect-A-Flo when used as a liquid level control:

• **Has resisted external pressures** of 50 psi. with no effect. Fenwal believes it can readily withstand pressures up to 75 psi.

• **May be used with most liquids** since shells are made of stainless steel. Unit should not be used in liquids whose temperature exceeds 200 F.

• **Temperature effect** on control or response point is negligible between −65 and 200 F.

▶ **Specifications Summary**—Here are Detect-A-Flo's specifications, whether used as an airflow or liquid level detector:

• **Contact ratings:** 5 amp., 115 v. a.c.; or 2 amp., 28 v. d.c.

• **Heater wattage:** 33 w. at 27 v. and 115 v. d.c. or a.c.

• **Heater temperature:** Maximum is 500 F. in still air. It can be lowered to about 300 F. for liquid level applications.

• **Adjustment method:** Factory preset, non-adjustable in the field.

• **Life:** In excess of 100,000 cycles at maximum rated loads.

• **Dielectric strength:** Contact leads to case—1,250 v., 60 cycles, one minute. Heater leads to case—500 v., 60 cycles, one minute.

• **Insulation resistance:** Leads to case, contacts or heater—5 megohms (minimum).

• **Vibration:** Will withstand the vibrations specified in MIL-E-5272, Procedure I, without malfunction or evidence of failure. (Varying accelerations from 5 to 10 cps. at .050 in. double amplitude; 10 to 73 cps. at .036 in. double amplitude, and 73 to 500 cps. at 10G acceleration.)

▶ **Other Products**—Fenwal makes a variety of Thermoswitches, aircraft fire and overheat detectors and combustion

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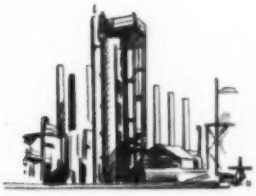
Yet the quality control of ESSO fuel is vigilantly supervised every step of the way. En route, the product is subjected to numerous quality inspections to insure uniformity and compliance with specifications.



To begin with, a complete analysis is made at the refinery when the newly manufactured fuel goes into storage tanks to verify that the product meets or exceeds government, airline, and ESSO's own standards.

A second series of tests is made on composite samples taken from the tanker immediately after loading.

On completing the

voyage, cargo samples of the fuel are checked for quality just before off-loading into ocean terminal storage tanks.

Product samples from the ocean terminal are subjected to a quality analysis; from the ocean terminal the product may go through an inland storage depot or directly to airfield storage.

Airfield storage samples are tested at regular intervals.

When airport refuelers are loaded, and after each change of shift, the fuel is carefully checked for possible water content and contamination.

As a final precaution, all fuel is

passed through 5-micron filters during refueling by ESSO airport service personnel.

Yes, ESSO's follow-through tests and analyses make the difference. They mean greater safety and better performance because they guarantee *Quality Controlled* aviation fuel at all times wherever and whenever ESSO aviation gasolines are delivered into aircraft by ESSO Aviation Service.

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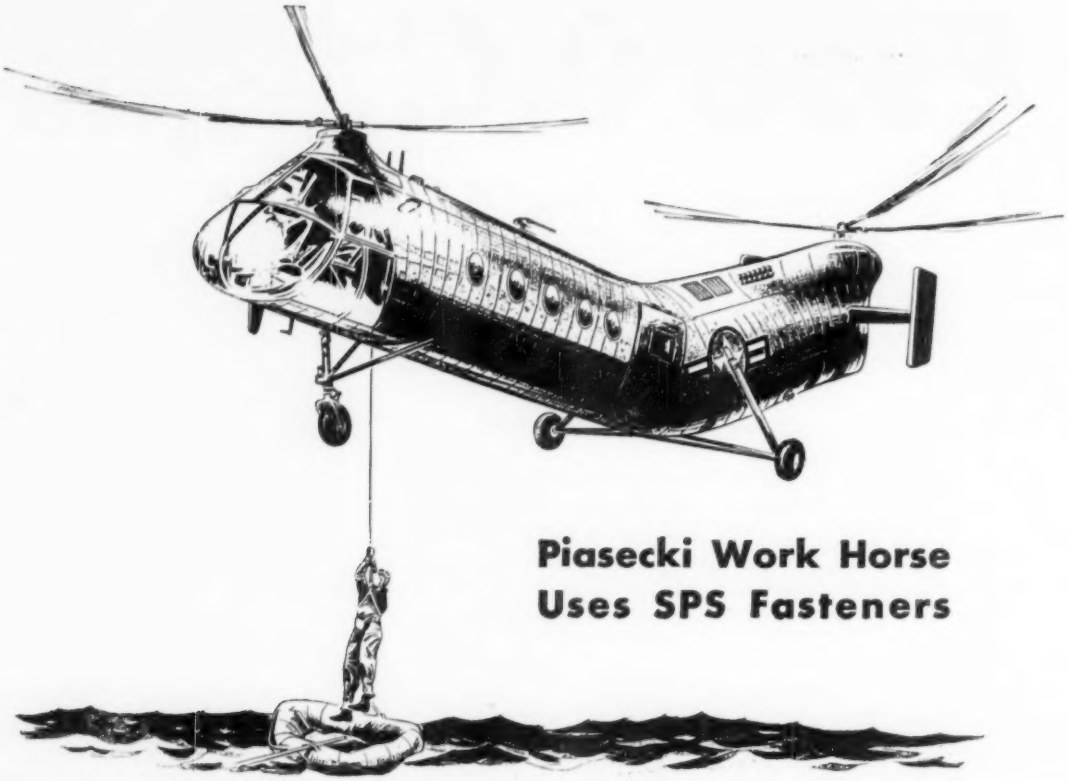

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heater controls. It also makes test equipment for its products. Among these:

• **Field test kit #80022.** This newcomer to the company's line was originally suggested by United Air Lines, according to Fenwal. It will check, with reasonable accuracy, the operation of several detectors without having to remove them from the aircraft.

Kit is made up of a control box which indicates operating temperatures in degrees Fahrenheit, and a split heater block which clamps on to the detector sensing unit. The heater block, which is connected to the control box by a flexible cable, mounts a pilot light to indicate opening or closing of the detector contacts. Another set of leads clip to the electrical connections of the detector unit. When hooked up, detector will control the temperature of the heated block.

Fenwal says that the unit is available to any airline that wants it.

The company also makes a series of field temperature test kits to check heater controls and detectors. Standard series #80001 provides a precise means of setting Thermoswitch controls at temperatures up to 600 F and the firm's series #80001-5 can go up to 1,000 F.

• **Midget Thermoswitches.** Dimensions of these small-size versions of the basic inverse-type Thermoswitch immediately suggest missile applications. Current uses are for overheat warning in transmissions of Piasecki HUP and H-21 helicopters, according to Fenwal. It operates a pilot light in the cockpit. Units are also used as heater duct fire detectors in Martin 4-0-4 transport aircraft.

Thermoswitches are 2¼ in. from mounting flange to tip, ¼ in. in diameter and weigh 11/16 oz. Temperature range is −50 to 450 F.

• **Smaller midgets.** Designed for use with the latest miniaturized electronic equipment where space and weight are at a premium, the miniature Thermoswitches come in two series. The #32000 series are rectangular, measuring 1 in. in length, slightly over ⅞ in. in width and ½ in. in height to top of terminals. Weight is ⅞ oz. The #32100 series is circular, with ¾-in. diameter; and total weight, including terminals of ½ in.

The miniature Thermoswitches are fully adjustable from 0 to 200 F. Units can carry 250-w. load, withstand vibrations of over 5G, and maintain temperatures to within 2-3 deg. in a well-designed system. They can withstand temperatures from −65 to 220 F. indefinitely.

• **Fire and overheat detectors.** Fenwal officials claim that their overheat detectors are currently being used on about 90% of all jets turned out in the U. S., including the B-52, B-47, B-36, F-89, F-86 and F-84. Among commercial craft, the Constellation, Super Constellation, DC-3, DC-4 and C-46 use the units, Fenwal says.

Detectors come in a variety of types: single-terminal or two-terminal, with right angle or straight mounting arrangement for either type. Some are adjustable, others are preset at the factory. All are hermetically sealed. The units have a very rapid rate of response to temperature rise and give a warning as soon as temperature reaches the warning point.

• **Rate-of-rise Thermoswitches.** Fenwal says these units were first used to prevent too-rapid temperature rise in 600,000-Btu. combustion heaters in the DC-6. Struts and shell have the same coefficient of expansion. Operating in series with the usual cycling and overheat controls, the rate-of-rise Thermoswitch gradually cycles the heater up to desired temperature, preventing over- or under-shooting heater operating temperature limits.

Units may be set for rates of rise varying from 10 to 100 degrees F. per minute.

Temperature exposure range is −100 to 500 F.

For additional information write Dept. 105

Gladden Products Corp., 635 W. Colorado Blvd., Glendale 4, Calif.

RESEARCH

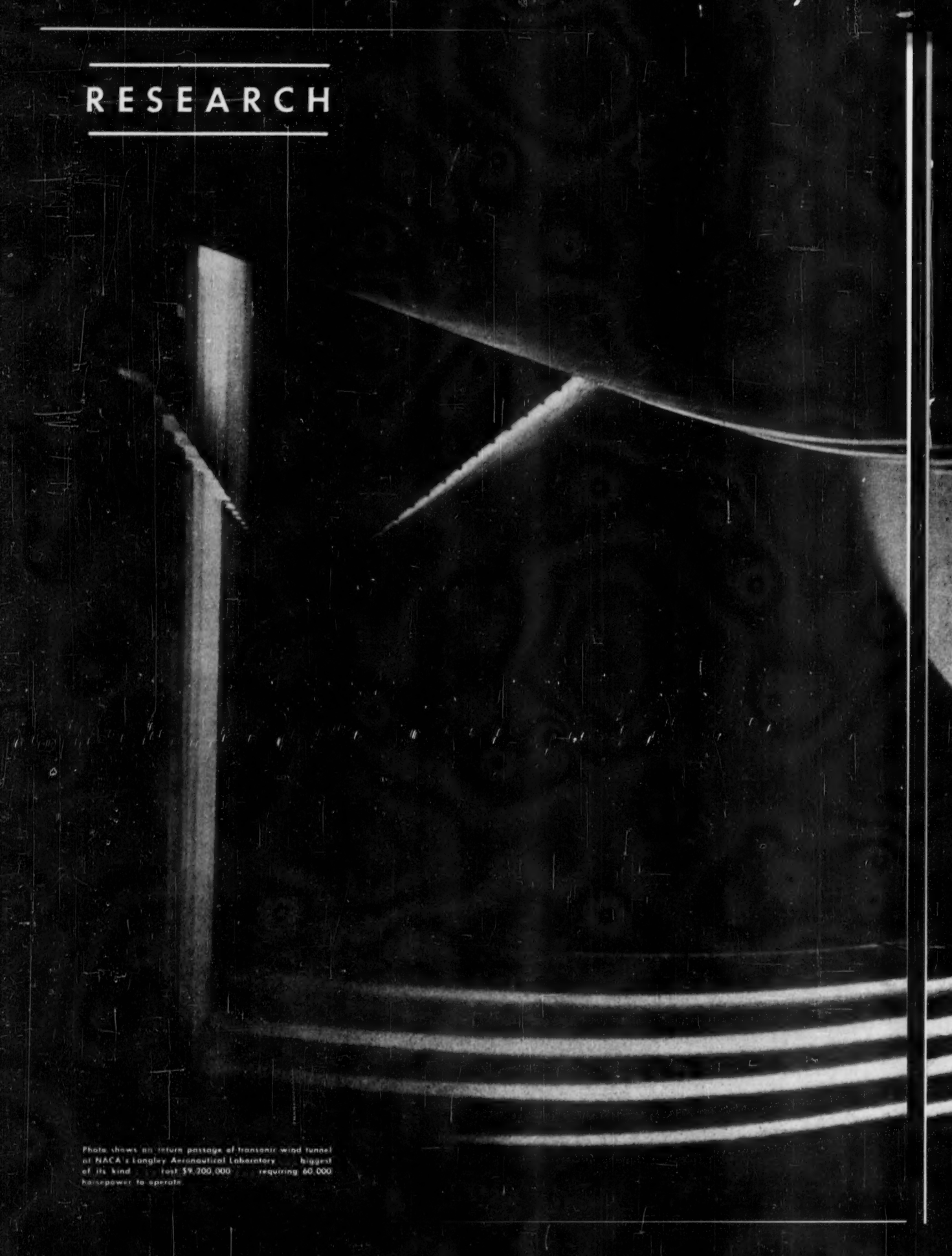

Photo shows an intern passage of transonic wind tunnel at NACA's Langley Aeronautical Laboratory biggest of its kind cost $9,200,000 requiring 60,000 horsepower to operate.

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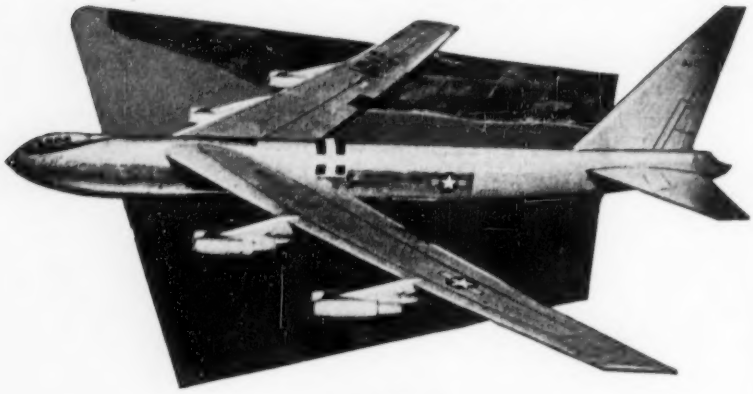

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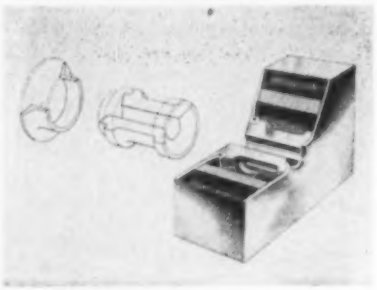


Fastener Is Easy to Use On Honeycomb Material

A new unit for fastening objects to honeycomb material has been developed by the Shur-Lok Corp.

Known as the Kwiko sandwich structure spacer, this fastener is said to permit easy installation without the use of special tools. It can be manufactured in a variety of sizes to meet specific requirements.

Light but rugged, the unit is said to be ideal for attaching instruments, seats, shelves, electrical equipment and other objects to honeycomb structures.

It is designed in two series, the SL20 for ordinary AN bolts and the SL21 for 100-deg. countersunk bolts.

Shur-Lok Corp., 9010 Bellanca Ave., Los Angeles 45, Calif.

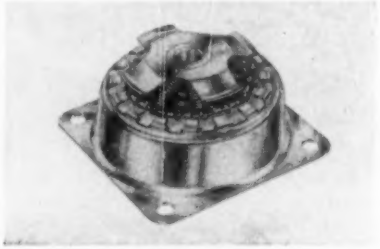
All-Metal Isolators Damp Out Vibration

A new line of all-metal vibration isolators is being offered by the Ucinite Co., division of United-Carr Fastener Corp.

Known by the trade name Equiflex, the units offer longer service life and freedom from drift or permanent set. Manufacturer states that temperature extremes have no effect on performance, adding that mountings withstand 100-hr. salt spray tests.

Shocks of 15G reportedly can be sustained without damage and equipment is restrained up to 30Gs. Units are designed to absorb vibrations both vertically and horizontally.

The isolators come in three sizes: for



light loads, such as instruments and other vibration-sensitive devices; for medium loads, such as panels or boxes containing electronic equipment; and for big loads like auxiliary powerplants and gasoline-driven compressor units. Load rating in pounds is stamped on each mount.

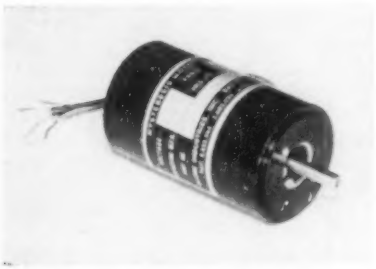
Construction of the Equiflex mount consists of a tubular core, attached by springs to a square mounting plate or circular mounting cup. Springs form two opposed cones. Within the cones are two metal stampings separated by an internal compression spring.

Ucinite Co., division of United-Carr Fastener Corp., Newtonville, Mass.

Tiny Precision Motors Provide 400-C. Power

Availability of a new line of miniature precision motors for 400-cps. applications is announced by Globe Industries, Inc.

Units are hysteresis-synchronous motors, adapted to power, servo or timing applications. As servo units, motors can be wound for two-phase operations, while for timing and power they are available as single-phase capacitor-run motors.



Entire line has been designed to incorporate same mounting pole and holes found on Globe's miniature P.M. motors, permitting addition of the company's standard gear reducers to form combined package.

Motor measures 1¼ in. in diameter by 2¼ in. long, available for two- or four-pole winding for 24,000 or 12,000 rpm. Manufacturer states that design is consistent with aircraft application requirements, and that motor is suitable for operation under extreme environment conditions.

Rotor is mounted on double-shielded, grease-packed ball bearings. Stator windings use Teflon-insulated magnet wire, while motor leads are insulated with wrapped Teflon.

Globe Industries, Inc., 1784 Stanley Ave., Dayton 4, Ohio.

Improved Silicone Rubber Is Stronger, Shrinks Less

New development in silicone rubber, known as Silastic 675, has the lowest long-term shrinkage (1.8 to 2.5%) of any silicone rubber stock and lowest compression set values of any silicone rubber with non-toxic additives, Dow Corning Corp. claims.

Manufacturer also lists superior physical strength as a feature, as well as better tear resistance. It reportedly is serviceable at temperatures ranging from below –100F to above 500F.

Product is chiefly for use with gaskets, O rings, seals and molded industrial rubber goods. It can also be molded in dies designed for organic rubber parts, provided tolerances are not too close.

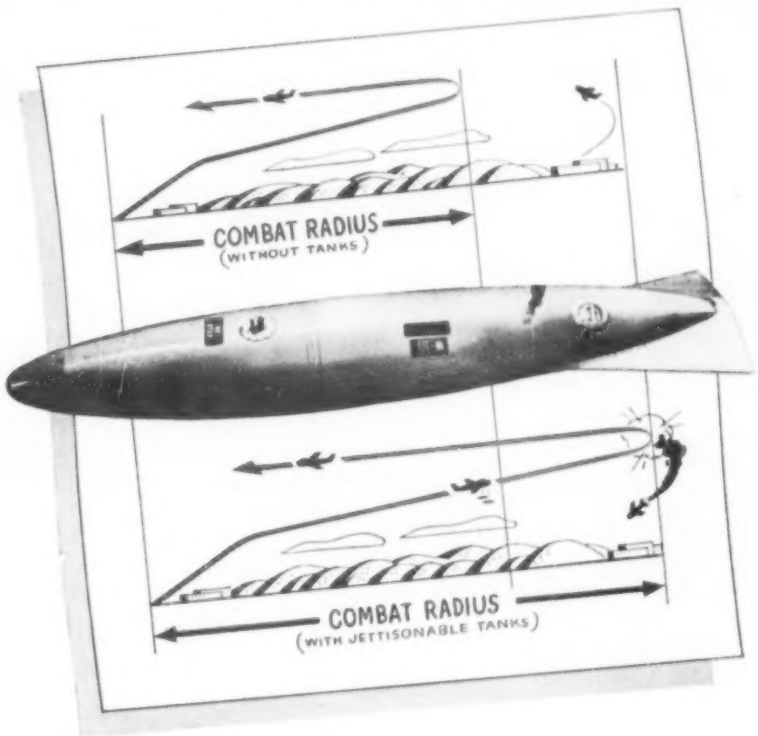
Dow Corning Corp., Midland, Mich.

Aluminum Cleaning Costs Reduced by Two-Thirds

Cleaning compound for aircraft aluminum surfaces is being put on the market now by the Van Straaten Chemical Co.

Reported to have been successfully demonstrated with several leading aircraft users, the cleaner is said to eliminate need for using either inflammable or toxic solvents or expensive emulsion-type cleaners.

Incorporating an alkali cleaning base, the compound will reduce cleaning costs by about two-thirds, the manufacturer says. Cleaner may be applied



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Known as Vantrol 5499F, the cleaner sells for 12 cents per lb., can be in concentration of 8 oz. per gallon for direct application with mop or rags, and at lower concentrations when used with steam jenny. Vantrol will remove oil and surface oil without crazing Plexiglas or affecting painted surfaces. It will not stain or etch aluminum, zinc or ferrous metals, the manufacturer claims.

Van Straaten Chemical Co., 546 Washington Blvd., Chicago, Ill.

Aircraft Duct Coupling Saves Weight, Space

Rubber Teck, Inc., offers substantial reductions in size, weight and number of parts over standard AN coupling assemblies with its new line of rigid aluminum duct connectors.

Unit reportedly reduces overall length of AN design coupling by 62% and reduces total weight by 68% (for 2-in. tube size).

Small size of the coupling unit permits smaller holes in structure for installation.

Connector is made for tube sizes 1 in. to 2½ in., consisting of lightweight aluminum nut, aluminum coupling and aluminum insert ring. It is said to perform satisfactorily in temperatures up to 500F fluid or air, and meets requirements of MIL-F-5506A modified specifications. It is sold under license from Douglas Aircraft Co.

Unit is also available in stainless steel model.

Rubber Teck, Inc., 19115 S. Hamilton St., Gardena, Calif.

ALSO ON THE MARKET

Elastomeric O-rings for pressure sealing, feature close tolerance and subminiaturization, are designed to meet space requirements of aircraft, airborne equipment, guided missiles and rockets. They are for use in pumps, valves and nozzles. Known as the 6227 series, they are available in three stock sizes: .029x.040 x.109 in.; .070x.040x.150 in.; and .100x .070x.240 in.—Stillman Rubber Co., 5811 Marilyn Ave., Culver City, Calif.

Decals, series E-51, for identification of fuel line replacement parts will withstand high temperature and most solvents except for Skydrol hydraulic fluid. Same manufacturer's HR deal will withstand heat up to approximately 900F, is impervious to aromatic fuels and Skydrol. Both E-51 and HR can be applied with water alone.—Meyercord Co., 5323 W. Lake St., Chicago 44.

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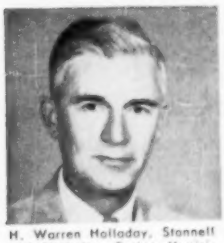
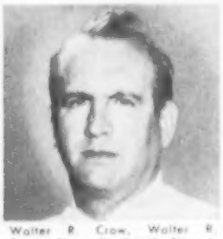
Fred Smith, Sales Manager, AiResearch Aviation Service Co., 5907 W. Imperial Highway, Los Angeles 45, California.



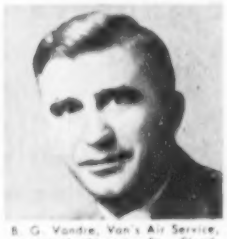
H. Warren Halladay, Stannell and Halladay, Easton Municipal Airport, Easton, Md

Don Pennington, Carolina Aero Company, Municipal Airport, Asheville, North Carolina.

George Harte, Harte Flying Service Inc., Chanute Municipal Airport, Chanute, Kan.



Walter R. Crow, Walter R. Crow, Inc., Municipal Airport, Toledo, Ohio.



B. G. Vandre, Van's Air Service, Municipal Airport, St. Cloud, Minnesota.

C. W. "Wayne" Crussell, Southern Aero, Inc., Municipal Airport, Atlanta, Georgia.

Cheston M. "Chet" Newhall, The Babb Co. (Canada) Ltd., Montreal Airport, Dorval, P.Q.

Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.

O. B. Callan, Sales Manager National Aero Sales Corp., Midway Airport, Chicago, Ill.

Don Hood, Air Sales and Service Company, Wier Cook Municipal Airport, Indianapolis, Indiana.

Peter Graves, Southern Ohio Aviation Company, Inc., Dayton Municipal Airport, Vandalia, Ohio.

T. E. "Ted" Byron, Aero-Ways, Inc., Municipal Airport, Cleveland, Ohio

J. K. "Johnny" Hamp, Aero Sales Division, Houston Transportation Co., Municipal Airport, Houston, Texas.

Cy Willock, Sales Manager, Downtown Air-Park, Inc., 1800 South Western, Oklahoma City, Oklahoma.

H. Leibee Wheeler, Buffalo Aeronautical Corporation, Buffalo Municipal Airport, Buffalo, New York.

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FINANCIAL

I. Average Revenue per Passenger-Mile

(Cents per Passenger-Mile)

Year	Class I Railways: Parlor Car & Sleeping Car[1]	Class I Railways: Coach*	Intercity Class I Motor Carriers	Scheduled Domestic Airlines[2]
1942	2.40	1.77	1.65	5.28
1946	2.45	1.82	1.66	4.63
1947	2.74	2.02	1.70	5.06
1948	3.01	2.29	1.74	5.76
1949	3.14	2.41	1.84	5.76
1950	3.25	2.47	1.88	5.55
1951	3.27	2.47	1.94R	5.60
1952	3.35	2.53	2.03P	5.00
Percentages of 1942				
1942	100.0	100.0	100.0	100.0
1946	102.1	102.8	100.6	87.7
1947	114.2	114.1	103.	95.8
1948	125.4	129.4	105.5	109.1
1949	130.8	136.2	111.5	109.1
1950	135.4	139.5	113.9	105.1
1951	136.3	139.5	117.6R	106.1
1952	139.6	142.9	123.0P	94.7

R—Revised. P—Preliminary. *—Coach revenue other than commutation.

1. Revenue figures cover rail passage tickets only, excluding space charges for parlor and sleeping cars.
2. Source: Civil Aeronautics Administration, Statistical Handbook of Civil Aviation, and later data, as presented by the Bureau of Transport Economics and Statistics, Interstate Commerce Commission.

Air Share of Intercity Traffic Up

The domestic airlines showed an increase of 18.66% in intercity passenger-miles in 1952 over the previous year being up to 12.6 billion from 10.6 billion. By contrast, railroad travel was down 1.69% during the same period. Motor carriers of passengers also showed a decline for 1952 compared to 1951, decreasing 5.30%.

These comparative substantial gains made by the domestic airlines and their low rate structure are highlighted in a current review released by the Interstate Commerce Commission's Bureau of Transport Economics and Statistics.

▶ **Growing, But Small**—While air transportation showed the largest traffic gains and its penetration of the intercity market increased during 1952, it still represents a very small segment of the overall total.

For example, in 1952 a total of 480.1 billion passenger miles were recorded by all transport agencies, with the airlines accounting for only 2.62%. In 1951 the airline participation ac-

II. Average Revenue per Passenger-Mile

(In terms of all rail passenger-miles revenues as 100)

Type of Transportation	1942	1946	1951	1952
All rail	100.0	100.0	100.0	100.0
Rail commutation	55.2	55.4	65.8	70.3
Parlor and sleeping car	125.0	125.6	125.8	125.9
Rail coach (other than commutation)	92.2	93.3	95.0	95.1
Class I motor carrier	85.9	85.1	74.6	76.3
Scheduled domestic airlines	275.0	237.4	215.4	188.0

Source: Bureau of Transport Economics and Statistics, Interstate Commerce Commission.

counted for 2.36% of the 448.8-billion total overall market.

The largest segment of the travel market moves on the highways. During 1952, some 431.4 billion passenger miles were recorded in this manner, with private automobiles responsible for an estimated 410.3 billion, or 85.46%, of all intercity passenger miles.

Railroad travel, which represents a more competitive field for the airlines, is losing ground steadily. During 1952 the railroads showed passenger miles of 34.7 billion or 7.23% of the market.

► **Air Fares Drop**—Airline fares have decreased on an actual and relative basis; this is in sharp contrast to the trends prevailing for the other transport agencies. From Table No. 1, it can be seen that during 1942 the average airline fare was 5.28 cents a passenger-mile. By 1952 it averaged 5.00 cents. Stated in terms of the 1942 level this meant a decline of more than 5%. On the other hand, average passenger fares have risen sharply for all forms of rail and motor carrier services. The increase in rail coach fares from 1942 to 1952 has been almost 43%, while the motor carriers went up 23%.

Further emphasis of the relative greater value afforded by air travel is revealed by Table No. II. This demonstrates the sharp decline which has taken place in air fares relative to the all-rail tariffs. For example, in 1942 air fares averaged 2.75 times that of the composite rail experience. By 1952 this measure was reduced to less than 1.9 times.

The value found in air travel is even greater than that shown in the accompanying tables as no allowance is given for the inflationary price level in recent years.

► **Effect of Aircoach**—The decline in the average air fare is, of course, due to widespread aircoach services in recent years. The family fare plan has also made for lower unit revenue but has been relatively stable as a percentage of the overall domestic airline market. Coach passenger-miles, for example, have jumped from 3.8% in 1949 to 19.4% in 1952 while family fare business fluctuated between 7.5% and 8.3% of the total airline market during this four-year period.

There is no doubt that aircoach and other promotional fares have stimulated considerable new business. It is equally true that the low unit revenues and rising operating costs have been exerting a squeeze on profit margins. This condition, especially when viewed in the light of trends in other transportation agencies, would suggest that a stronger and higher fare structure for the airlines may be necessary if the industry is to maintain reasonable earnings.

—Selig Altschul

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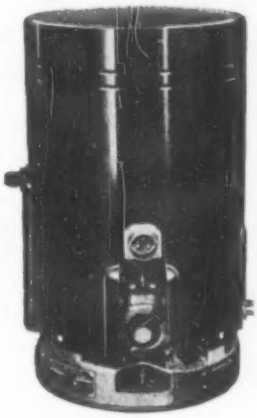

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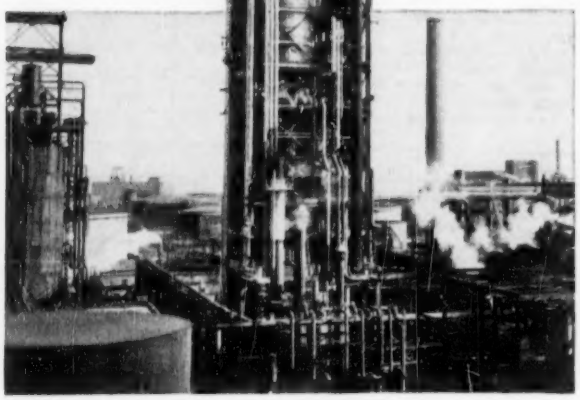

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CAB, Feederlines Fight Rising Subsidies

- **Major policies take form to block new increases.**
- **Joint effort recommends mergers, route changes.**

By Lee Moore

Civil Aeronautics Board and local service airlines are joining forces in an attempt to stop further increases of this industry's present $24-million subsidy budget.

Top executives of the local service lines met in Washington last week to plan group action through their affiliation as the Conference of Local Airlines, represented in Washington by former CAB chairman Donald Nyrop.

They want to act before the Administration and Congress take up the problem—the Administration through the President's civil aviation policy review by Air Coordinating Committee, and Congress in fiscal 1955 appropriation hearings.

One local airline president says the subsidy budget will increase at a rate of more than $1 million annually if the Board and the carriers do not act soon. Since CAB sent its fiscal 1955 subsidy estimates to the White House this month (AVIATION WEEK Dec. 14, p. 14), four temporary rate increases have been granted, and more are on the way.

These are major policies taking form at CAB now, following analysis of recommendations sent by the carriers:

• **Foster more mergers** in certain areas where consolidation would pay off in lower overhead and better fleet and route utilization. Transfer of parts of the Lake Central Airlines route structure to two or more other carriers is being investigated. Other mergers in negotiation include Pioneer-Continental Air Lines and Allegheny-Mohawk Airlines. CAB for two years has tried to bring Bonanza Air Lines and Southwest Airways together.

• **Transfer trunkline towns** to local service routes where this would boost local revenues without harming the trunkline.

• **Eliminate small towns** that are not developing sufficient traffic to make continuation of the experimental service worthwhile.

• **Lend prestige** and moral support of the federal government to the small carriers in their industry-civic relations on such projects as cutting airport landing fees and boosting state and city promotion of travel on local service routes (AVIATION WEEK Nov. 30, p. 68).

CAB sources indicate there will be no single new policy statement on this program but that results soon will be apparent in day-by-day route, merger and mail-rate orders.

► **Costs Rise**—Increases in costs started in 1952 and are continuing unabated. Almost every one of the 14 lines has asked and received a rate increase in the last 18 months.

Local Service Airline Costs Exceed Commercial Revenues

(Third quarter financial comparison for DC-3 operators)

	1952	1953
Earnings per plane mile		
Operating cost	$1.00	$1.05
Commercial revenues	.53	.55
Extra revenue needed to break even	.47	.50
Mail and subsidy pay	.46	.50
Total revenue	.99	1.05
Profits (or loss)	(−.01)	0
Capacity used		
Average passenger load	9	9
Average total commercial load factor	42%	41%
Load factor needed to break even*	78%	79%
Industry size		
Total commercial revenue	$4,993,000	$5,756,000
Total revenue, including mail and subsidy	$9,274,000	$11,097,000
Total number of employes	5,185	5,840

*Percentage of capacity for commercial payload to break even without U. S. mail and subsidy pay.

Source: Ray & Ray, from Civil Aeronautics Board statistics.

Subsidy Need

Local service airlines needed the following subsidy rates per revenue ton-mile flown during the past eight years to break even:

1946	$2.28
1947	1.19
1948	1.09
1949	0.97
1950	0.75
1951	0.56
1952	0.58
1953*	0.61

*Twelve months ended June 30, 1953.
Source: CAB

In response to a fact-finding letter from CAB member Josh Lee, local service airlines are sending individual recommendations to the Board. About half of them had been received last week, with detailed studies from Allegheny, Bonanza and Ozark Air Lines.

The carriers generally report:

• **Air Line Pilots Assn.** demands a local pay scale equal to that for trunklines on comparable (DC-3) equipment. Piedmont Airlines' pilots threatened to strike for such $50-$100 wage increases a week ago but settled for a compromise averaging $30 a month.

Pilots argue that it is not up to them to subsidize the federal-subsidized carriers. Managements answer that while this is a truism "philosophically," the practical situation is that a substantial pay increase requiring a big subsidy boost might jeopardize the financial and/or political status of the industry.

• **Some airport managements** are increasing landing fees, taking as much as 40% of the revenue that a local carrier obtains from a load picked up at a particular station.

• **Maintenance** on the 15-year-old DC-3 is becoming more expensive as original inventory of spare parts dwindles, requiring replacement by costlier custom-made parts.

• **Small town routes** previously cer-

tificated by CAB often have proved unprofitable, yet mail-rate mileage formulas and the obligation of implementing the certificate may force some airlines to continue heavy-loss services.

▶**Local Service Position**—Subsidy need for local service airlines per ton-mile of passenger and cargo traffic declined from $2.28 in 1946 to 56 cents in 1951. With costs stabilized and revenue load factors increasing, CAB announced that almost all locals soon would have "final," fixed subsidy mail rates.

Rising unit costs and inability to increase average load factors in 1952-53 forced the carriers to seek rate increase. They again were on cost-plus type temporary rates, with costs still rising and load factors remaining at about 40%.

This indicated to CAB members last summer and autumn that there was little chance of subsidy elimination in this decade. They decided that subsidy for the "experiment" must not rise much above its current $24-million level until big, efficient helicopters and other new developments enable the local service air transport industry to resume rapid progress toward self-sufficiency.

▶**Members Act**—CAB members Lee and Joseph Adams, who have been among the industry's most ardent promoters, set about to find what could be done to help.

Adams set up a program for state-city-airline cooperation. Lee wrote the carriers asking their advice on how to cope with the crisis. The replies are being studied closely by the Board staff and members.

Meanwhile, the CAB majority members have initiated the present Board-industry effort but are proceeding confidentially to avoid any appearance of emergency.

Harmar Denny and other CAB members also have been campaigning individually for local city and chamber of commerce aid to the locals. The Board last week was considering how best to use its position to reach all the civic groups with this campaign.

▶**Up to CAB, Carriers**—Nyrop told AVIATION WEEK the current joint effort of CAB and the carriers should be successful in restoring the favorable trend in development.

Route streamlining is a major key, he noted. Cost differentials among the various airlines, he said, are largely attributable to their different route structures. The higher-cost operators thus can be improved by tailoring their routes generally in accordance with the new Board program.

CAB ORDERS

Dec. 7-13

GRANTED:

Lake Central Airlines temporary permission to serve Lima, Ohio. Company estimates that Lima service will involve direct operating expenses of $16,000 and revenues of $47,398.

Niagara Falls, N. Y., leave to intervene in the New York-Chicago service case.

Trans-Texas Airways temporary subsidy mail rate increases proposed two weeks ago by CAB.

Riddle Airlines special exemption to transport military personnel on furlough from military bases to major cities during holiday rush period, Dec. 15-Jan. 10.

Continental Air Lines special exemption to make five Wichita Falls-Kansas City flights and an additional five Lawton-Fort Sill-Kansas City trips with furloughed military personnel Dec. 15-25.

Kodiak Airways extension of permit to fly present temporary routes in the area of Kodiak, Alaska, until 30 days after CAB decision of the carrier's pending certificate application.

Transocean Air Lines special exemption to make one Munich-New York and one Brussels-New York flight under contract with the Intergovernmental Committee for European Migration.

Pioneer Air Lines permission to suspend service to Tucumcari, N. M.

AMENDED:

Airtaxi operator regulation that prohibited use of the names "airline," "airlines" or "airways." CAB now decides that such restriction is unnecessary, as the public does not confuse these services with regular airlines.

DISMISSED:

North Central Airlines request to increase base mileage limit on its temporary mail rate. Dismissed at company request.

DENIED:

Mackey Airlines request to serve Tampa and St. Petersburg as coterminal points on its route, in addition to coterminals West Palm Beach-Palm Beach and Ft. Lauderdale, Fla.

Roswell, N. M., petition for reconsideration of CAB order denying Pioneer Air Lines route extension to Roswell.

North Central Airlines request to suspend service to St. Cloud, Minn.; CAB has started an investigation to see if NCA's segment No. 5 of Route 86 should be changed.

Air America Loses Right to Operate

Civil Aeronautics Board, by a 3-2 vote, has revoked the letter of registration of Air America, a nonscheduled air carrier, for operating as a scheduled airline without proper certification.

Air America operated almost-daily transcontinental flights.

The majority — chairman Oswald Ryan and members Chan Gurney and Harmar Denny—also condemned Air America for honoring passenger tickets which did not bear the carrier's own name.

Certificated carriers can honor such tickets, but a Board regulation (aimed at stopping ticket-agent pools of carrier services) forbids nonskeds from honoring agent's tickets under certain conditions.

▶**Dissent View**—Minority members Josh Lee and Joseph Adams dissented, each citing slightly different reasons for urging that Air America be permitted to continue operation under strictly controlled conditions.

Lee said the final action should be stayed until completion of the Board's general investigation of regulatory policy toward nonsked frequency and regularity and should be allowed to operate within strict rules until then. Adams said the Board should issue a cease-and-desist order to Air America first, as it did to five other former violators, rather than immediately invoking "the ultimate sanction of revocation."

▶**Majority View**—The Board majority called Air America's continued route-type service "contumacious defiance" of previous CAB staff warnings. The Board added that "respondent's violations have

"Super-Six" Service to Dominican Republic

Pan American World Airways has extended its Douglas DC-6B "Super-6" service to include the Dominican Republic, where one of the big transports is seen prior to start of regular schedules on Nov. 20. Pan American's DC-6B "Clipper" transports now are used between Miami-Port-au-Prince, Haiti; Cindad Trujillo, Dominican Republic; Curacao, N.W.I.; and Caracas, Venezuela.

been of a flagrant character and indicate a studied indifference to economic regulations."

The majority took the position that "our failure to revoke respondent's letter of registration under the circumstances involved here would serve only to encourage other irregular carriers to engage in similar violations, secure in the knowledge that their authority to operate would not be jeopardized."

CAB concluded: "Such a result would effectively negate our efforts to regulate air transportation in accordance with the mandate of the (Civil Aeronautics) Act."

Resort Claims Tours Aid Other Airlines

Resort Airlines' Caribbean tour service is "helping, not competing with" other domestic scheduled air carriers, president Walter Sternberg is claiming during tours of major eastern and midwestern cities.

Sternberg plans to build most of the airline's Caribbean business on interline sales and service that bring Resort's customers to Miami, start of the tour.

He cites advertising and promotion in Chicago, Detroit, Cleveland and Boston, where the prospective customers must use other airlines to connect with Resort service. The airline is spending $18,000-$20,000 in Chicago alone this winter, Sternberg says.

As another example of how Resort relies on service of other airlines, Sternberg reports that of 1,000 seats a week his company is scheduling out of Miami to the Caribbean this winter, 825 must be filled by passengers using connecting services of other airlines to Miami.

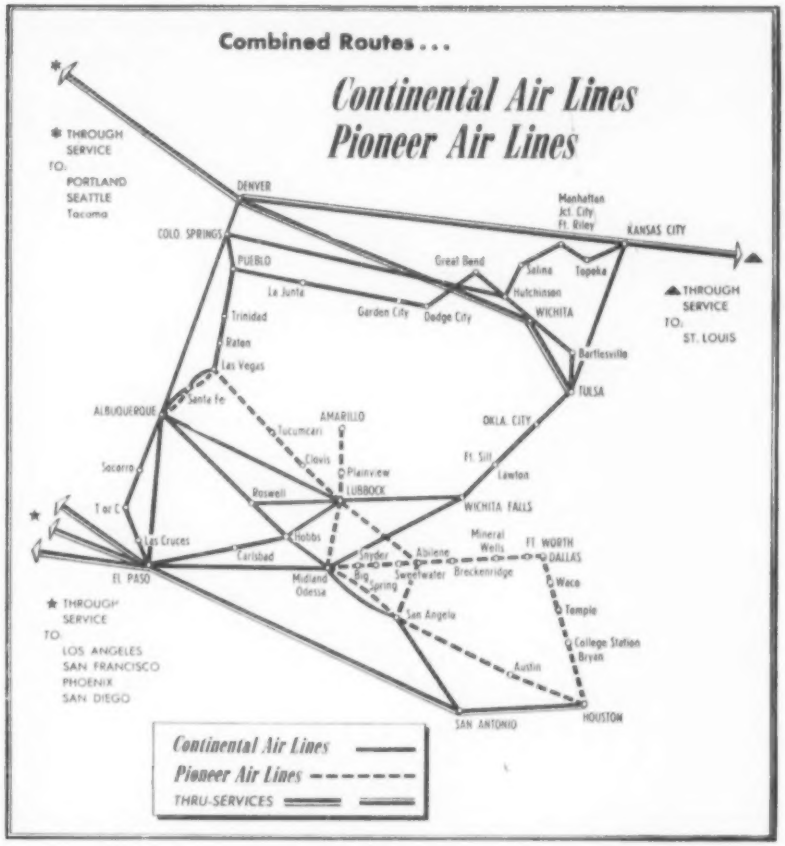
PAA Asks Fare Cut In Central America

(McGraw-Hill World News)

San Salvador—Pan American World Airways has asked Civil Aeronautics Board for permission to cut Central America fares 30% to meet KLM Royal Dutch Airlines competition, PAA officials here report.

KLM's regular fares are approximately the same as Pan American's, but the Dutch airline's recently instituted tourist rates have cut into the U. S. carrier's business in this area.

Meanwhile, PAA has signed a labor contract with its Guatemalan employes, removing the threat of suspension of service in that country. The new one-year contract provides for substantial reductions in the airline's staff in Guatemala.



Continental, PAL Propose Merger

Civil Aeronautics Board is expected to approve Continental Air Lines' proposal to purchase Pioneer Air Lines, submitted last week, because it promises to help solve the Board's local service subsidy problem (see p. 67).

Under terms of the joint application of the two airlines, Continental would pay Pioneer its book value in cash plus 65,000 shares of CAL stock valued at $6 a share.

The Oct. 31 book value of the PAL assets to be bought was $597,097. Purchase valuation of these assets is to be as of the last day of the month in which the merger is approved.

► **Combined Forces**—Routes of the two carriers will be combined, and personnel of both airlines will be retained. Continental employs 962; Pioneer, 365.

PAL president Robert J. Smith and board chairman William F. Long would join the Continental board of directors, increasing its number from 11 to 13.

CAL also would retain Pioneer officers Harding L. Lawrence, Harold B. Seifert and E. W. Bailey.

► **No Martin 2-0-2s**—PAL stockholders would retain their shares in the separate Pioneer corporation holding nine Martin 2-0-2 aircraft.

These transports were retired from scheduled service when CAB refused to increase Pioneer subsidies to operate the planes, bigger than the DC-3s previously operated by the carriers (Aviation Week Mar. 3, p. 73). Pioneer has operated leased DC-3s since, splitting off the Martins into a separate plane-owning corporation.

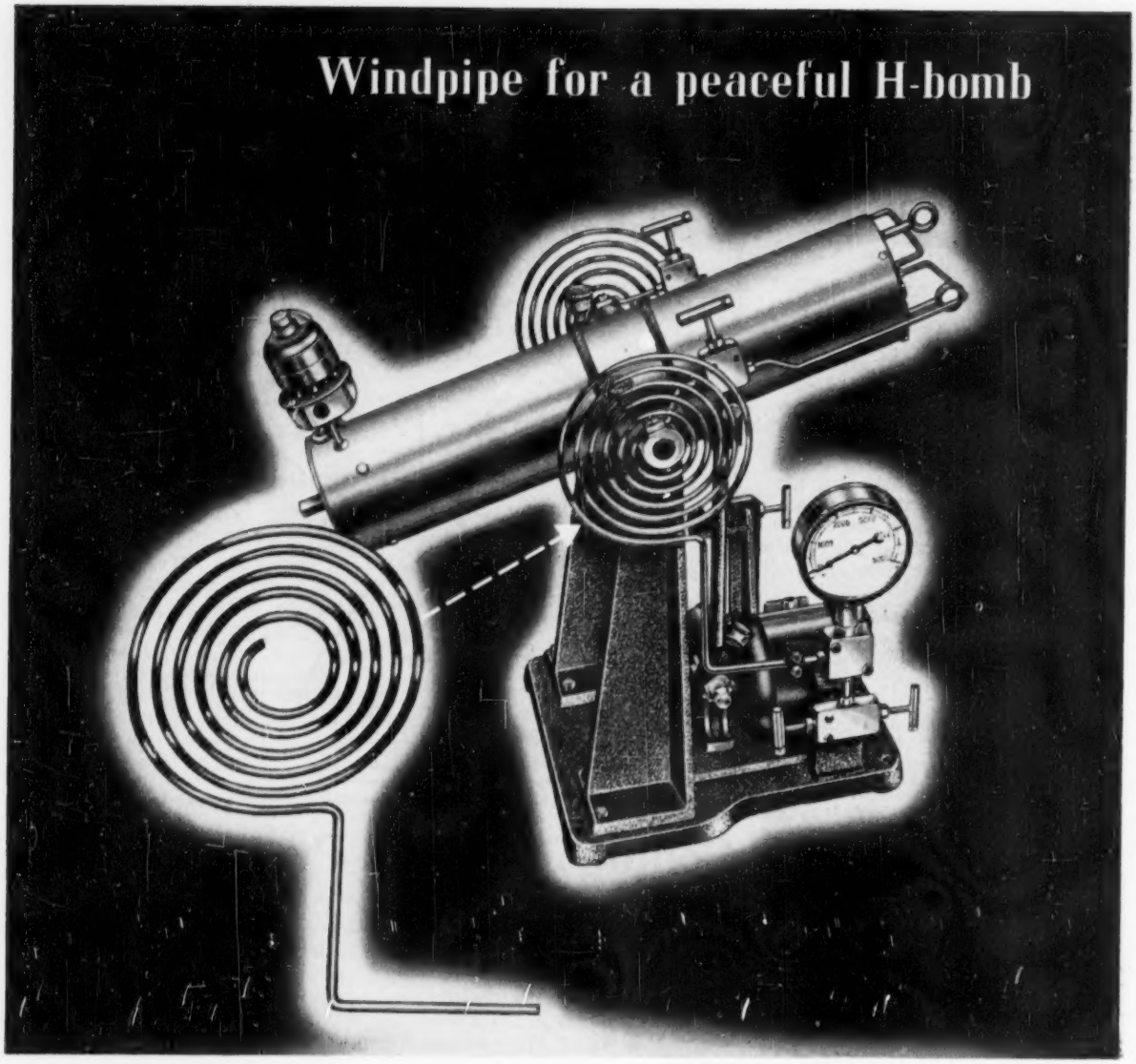
Continental already has modern DC-6 and Convair transports. Its Oct. 31 balance sheet shows total assets of $11,296,319, including property (mostly flight equipment) at $7,035,-865.

CAL's equity capitalization is $4,623,529 plus long-term debt of $3,375,-000. Net working capital Oct. 31 was $618,538.

PAA Tests Aptitudes

Pan American World Airways flight service personnel are being given a sample aptitude test developed by Stanford University Counseling and Testing Center to form the basis for developing standards for screening job applicants. Attitudes, personality traits and interests of the airline's most successful present employes will be considered.

Windpipe for a peaceful H-bomb



You can call it an H-bomb if you like. Some people do. Technically, it *is* a hydrogenation bomb or, simply, a super-pressure vessel. Uses for it are legion but not warlike.

Researchers in rubber, plastics, pharmaceuticals, petroleum, and solvents pilot their hydrogenation, oxo-reaction, polymerization and other jaw-breaker problems in its gizzard—under high pressure.

To speed-up chemical reactions, the vessel is rocked 38 times a minute. Pressurizing a see-sawing chamber is in itself a neat trick: when pressures of the order of 60,000 p.s.i. are required you might become discouraged or concerned.

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Board Limits Guests On Ferrying Flights

Airlines can carry guests free in ferry operations, but must restrict the practice.

This is the import of a unanimous Civil Aeronautics Board decision in the Pan American World Airways ferry flight case, which held:

- **PAA's transport of invited guests** without charge on flights between New York and Miami, location of its major maintenance base, was not in violation of the 1938 Civil Aeronautics Act because the operation was not a common carrier service "in air transportation."

The airline operates out of New York and out of Miami, but is not certificated for the New York-Miami run.

- **Pan American must stop the practice** of giving free New York-Miami rides to guests who continue their journey beyond Miami as paying passengers.

The Board commented: "The result . . . may be to induce potential travelers over the routes of Eastern Air Lines between New York and San Juan and between Miami and San Juan, and of National Airlines between Miami and Havana, each of which routes competes with the commercial services offered by PAA between the same points, to select PAA as the carrier they will utilize in trips between those points in the future."

In approving PAA's free rides on New York-Miami ferry runs, the Board warned: "Although under the facts before us we are compelled to conclude that the free transportation . . . was not performed in violation of the act, we must nevertheless express our deep concern over a practice that results in the free carriage . . . on an extensive scale in operations over routes of other certificated carriers . . .

"This is not to say that we believe that free transportation by air carriers on flights not in air transportation to a limited extent and in appropriate circumstances is harmful and should be outlawed."

TCA to Fly Connies On Domestic Route

Trans-Canada Air Lines will start operating Super Constellations on its domestic route next fall, cutting Montreal-Vancouver time by two hours, TCA officials report.

This represents a change in the airline's original plans to limit Super Connies to international routes to Europe and the Caribbean.

Airline officials indicate the shift in plans is due to the fact that North Stars, now flying the Caribbean route are ideally suited to that service and stand up well against existing competition.

TCA's new daily transcontinental flight schedule:

- **Two first-class** North Star flights, currently operating.
- **Two North Star** tourist flights, to be inaugurated Feb. 1.
- **Two Super Constellation** first-class flights, to begin in the fall of 1954.

The Super Connies will accommodate 63 passengers in a two-and-two seating arrangement.

Australian Line Buys Two NAL DC-6s

(McGraw-Hill World News)

Melbourne—Australian National Airways this month will start operating two Douglas DC-6s, largest commercial airplanes flying domestic routes in Australia.

The transports were purchased in the U. S. from National Airlines. Each DC-6 seats 58 passengers and carries approximately 3,000 lb. of cargo, giving ANA a decided advantage over its government-owned competitor, Trans-Australia Airlines. TAA expects to operate Vickers turboprop Viscounts in competition with Australian National's DC-6s.

The private comany has ordered two DC-6Bs, scheduled for delivery early in 1955. The carrier expects to get high utilization out of its new equipment. ANA has been operating DC-4s at more than 4,000 hr. annually.

NAL Copter Service

Passengers disembark from a National Airlines Sikorsky S-55 at Miami's Tropical Park after a charter flight to the race track from Miami Beach Auditorium. NAL, first major U. S. trunkline to operate helicopters, has purchased three S-55s to serve Florida's Tampa-Sarasota-St. Petersburg-Lakeland region, Miami and Norfolk, Va.

Aircoach Builds Up Foreign Travel: Javits

Establishment of a 15-member U. S. commission to promote overseas travel and build up the dollar reserve of foreign nations will be proposed by Rep. Jacob Javits in the next congressional session.

Aircoach fares, Javits says, have been "a most extraordinary stimulus to international travel in the postwar era."

Travel impediments the commission would deal with include visas, customs, and other restrictions on travelers; port taxes, excessive documentary requirements, and similar restrictions on carriers; inadequacy of hotel accommodations, recreation areas and sightseeing, and costs of transportation.

Javits believes the 332,000-person volume of traffic to Europe and the Mediterranean area in 1952 could be increased to 800,000.

Proposed legislation is in line with the Administration's "trade not aid" program.

Sabena Cancels Rooftop Heliport

(McGraw-Hill World News)

Brussels—Sabena, Belgian Airlines, has abandoned plans to build a heliport atop its administration building here to serve as a terminal for the carrier's S-55 scheduled passenger service.

Official objections to the heliport have been filed by municipal and civil aviation authorities on grounds of noise and safety. The heliport site is less than 100 yards from an ancient national cathederal, where important ceremonies are held. The location would make it necessary for Sabena's copters to approach over rooftops and streets, a hazard in an emergency.

The airline also decided increased traffic might outgrow the heliport soon.

SAS Atlantic Traffic Makes Steady Climb

(McGraw-Hill World News)

Copenhagen—Scandanavian Airlines System flew 31,000 passengers across the Atlantic during April-September of this year, increasing from 20,000 persons for the same period of 1952 and 13,000 in 1951.

The continuing uptrend pushed SAS into fourth place among trans-Atlantic carriers, with 12.2% of the traffic for the April-September period. Other figures: Trans World Airlines, first place with 21%; Pan American World Airways, second with 18.9%, and British Overseas Airways Corp., third, 12.9%.

BY THE MCGRAW-HILL DEPARTMENT OF ECONOMICS

More Leisure Broadens Travel Market

IT TAKES TIME TO TRAVEL—even by air. And today, people have more time to travel than ever before. That's part of the explanation for past increases in use of airplanes, automobiles and other forms of transportation. The growth in leisure time for millions of people—from factory workers to farm hands—is one of the striking accomplishments of the American economy.

People will have even more leisure time in the future, if past trends continue. This increase in leisure time will steadily broaden the potential market for travel—including air travel. Here are some of the ways in which leisure time has been increased in the past, and may in the future.

1 **THE NUMBER OF HOURS** in the average work week has dropped spectacularly in the past fifty years. People worked between 50 and 60 hours a week at the beginning of the century. Now the 40-hour week is standard in most industries. And many office workers and employes in a number of other industries are working 35-hour standard weeks.

If the trend continues, most people will be working 35 hours a week within the next decade. And some will be down to 30 or 32 hours.

2 **PRACTICALLY EVERYONE** gets a paid vacation today. Vacations usually run for one or two weeks, but some fortunate souls get three or four weeks after a relatively short period of service with their companies. By contrast, only about one-quarter of labor contracts called for paid vacations as recently as 1940.

If this trend continues, three-week—and longer—vacations will become more common in the next ten years. And a few companies have even begun to experiment with much longer periods of paid time off. One is reported to offer some of its employes a full year off—with pay—after ten years of service. One-year-with-pay certainly won't become a very wide-spread program, at least not for a long time. But it illustrates the trend.

3 **MORE AND MORE PEOPLE** are getting pensions, relieving them of the need for full-time work after age 65. Social security began the move to provide general pensions, but many industrial companies now contribute, and have made pensions a major point of bargaining.

The number of people receiving pensions will grow sharply in the next ten years. One reason is the rapid pace at which pension plans are being added in industry. Another is the very large increase expected in the numbers of people over 65. And people with pensions will be more able to afford "luxuries" like travel in the future, too, because the amounts they receive—both from social security and private pension plans—are being increased.

4 **WORK WEEKS HAVE GROWN SHORTER** in days as well as hours. Almost everyone used to work at least a half day on Saturday. Now just about everyone is on a five-day week. Eliminating Saturday morning work added one night and half a day to the week end.

It's hard to say when the work week will shrink again, to four days. But if the trend to shorter hours continues, it seems inevitable that one day of work will be dropped eventually. That would make the week end very nearly as long as the work week.

Two major factors will determine whether these trends do continue—barring wars, serious depressions or other catastrophes. One is future improvement in productive efficiency. In the long run, people can only work shorter hours if they can produce more goods in less time. Past improvements in industrial equipment and methods of production have led to an average gain in this efficiency of about 2% a year. And, judging by the emphasis that industry now lays on improving its equipment and methods, gains like this will be made in the future.

The other important factor is the decision whether to take the benefits of rising efficiency in the forms of higher wages and profits, or in more leisure time. In past, about one-third has gone to leisure, the rest to money income. Judging by the recent emphasis on "fringes" in writing labor contracts, workers will continue to want at least this much of their improved standard of living in the form of leisure.

One author estimates that, if the same division is maintained in the future, and efficiency continues to improve, the normal work week will be cut by about five hours every ten years.

ALL OF THESE DEVELOPMENTS obviously create opportunities for any industry that sells transportation services. People had neither the time nor the energy for much traveling when they worked six days a week without vacations. Now they not only have the time and energy (work is easier, too), but money to pay for travel, as well. (AVIATION WEEK, November 23, p. 94).

But the growing leisure market is only a potential market—not an outright gift—to the transportation industries. Air travel must compete with many other attractive ways of spending leisure time. Some of the most prosperous of the consumer industries are those that have catered directly to this trend. People today can not only travel in their spare time, but do a host of other things ranging from feeding tropical fish through playing Scrabble to watching baseball on television.

But the potential travel market is there, nevertheless. And it promises to grow in the future. This leisure market —the long week end as well as the paid vacation—can be one of the growing sources of traffic for the air transport business in the future.

Final article in this series will discuss major factors in the relationship between air travel and general business activity. Earlier installments Oct. 12 and 19, Nov. 23, Dec. 7.

SHORTLINES

▶ **Allegheny Airlines** flew approximately 2.5 million passenger-miles in November, an increase of 45% above the same month of 1952 and highest on record for November in the carrier's history.... Allegheny resumed scheduled service Dec. 2 to Butler, Pa., a route suspended several years ago because of poor airport conditions.

▶ **British Overseas Airways Corp.** begins de Havilland Comet service from London to Nairobi, East Africa, in April.... BOAC now is authorized by Bermuda to pick up island passengers on the new tourist service between London, Barbados and Trinidad, a weekly service. When first requested, Bermuda turned down the airline without explanation for the ban.

▶ **California Central Airlines** carried 1,200 more passengers in November than during October and established a single-day record of 1,332 Nov. 29.

▶ **Civil Aeronautics Administration** and Mexico have agreed not to accept flight plans of pilots who propose to land at any airports not designated as ports of entry.

▶ **Denver's Stapleton Airport** has constructed a new one-story ticket wing, including one of the longest continuous counters in the nation.

▶ **International Civil Aviation Organization** has received a $19,717 (Canadian) check from Paraguay for the country's back dues from 1942 to 1952.

▶ **Lockheed Aircraft Service** has completed a contract with Avianca (Colombian national airline) providing for all maintenance and other services on two DC-4s to be put into service between Guayaquil, Ecuador, and New York.

▶ **North Central Airlines** has commissioned another 21-passenger DC-3 in its "Northliner" fleet at Wold-Chamberlain Field, Minneapolis-St. Paul.

▶ **Northwest Orient Airlines** has begun selling box lunches on its domestic tourist flights for $1.25. Baby kits also are available at $1.25. . . . NWA has filed application for special emigrant fares from Tokyo and Hong Kong to points in the U.S. and Canada.

▶ **Philippine Air Lines** is the first carrier to introduce the Convair 340 service to the Orient, using them on Manila-Hong Kong and Bangkok and Manila-Taipei routes.

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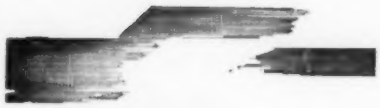

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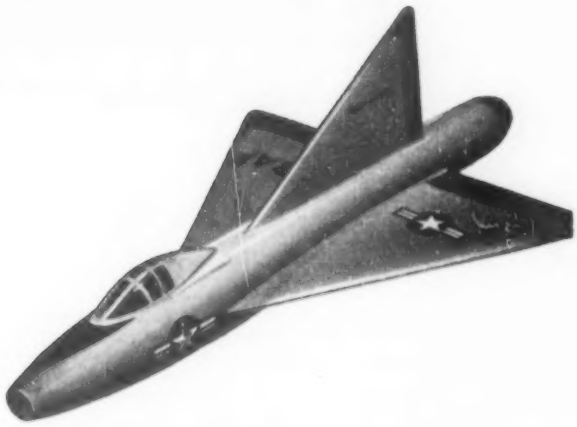

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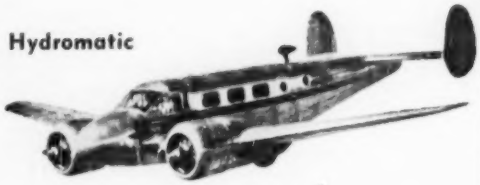

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Description	Mfg.	Part No.	Quan.
Heater	Surface Combustion Co.	83A9	6
Heater	Stewart Warner (200,000 BTU)	921B	230
Blower	Dynamic Air Engine	4582-AA-6C	18
Blower	Joy Manufacturing Co.	U-702-15	24
Tank Unit	Minn. Honeywell	G-1098D	11
Trim Tab Controller	Pioneer	#15701-R	20
Oil Cooler Assembly	U.A.P.	U8416-MM	12
Oil Cooler Assembly	U.A.P.	U8013-MM	14
Hydraulic Pump	Vickers	MF9-713-15H	120
Hydraulic Pump	Vickers	PF12-713-25BCE	124
Hydraulic Pump	Vickers	PF4-713-20BCE	327
Hydraulic Pump/ 3000 P.S.I	Vickers	MF45-3911-20Z	43
Hydraulic Cylinder	Air Associates	HC2109	29
Hydraulic Cylinder	Air Associates	HC2110	8
Fire Detector	Edison	117-47	46
Fire Detector	CO_2 Mfg. Co.	ASDC2	65
CO_2 Cylinders	Kidde	981980	185
CO_2 Cylinders	Kidde	M8700368	47
Anti-Ice Pump	Adel	D7818	125
Auxiliary Power Unit	Eclipse	NEP-2	29
Auxiliary Power Unit	Lawrence	LER-30D	16
Pump	Pesco	1EAR-280BH	15
Pump	Pesco	1E-621	8
Pump	Pesco	2E258SA	21
Separator	Pesco	3V-217-HC	32
Accumulator	Vickers	AA14002A	35
Actuator	Air Associates	M-2031	22
Wobble Pump (D-3)	Erie Meter	AN4014	17
Oxygen Cyl.	Kidde	923748	74
Windshield Wiper Kit	Marquette	K14949E	140

ENGINE ACCESSORIES

Starter	Eclipse	1416-12E	75
Generator	Eclipse (NEA-3A)	716-3A	100
Starter Motor	Jack & Heinz	JH950-R	90
Generator	G.E.	2CM46A2	4
Generator	Eclipse	1003-4	71
Carburetor	Stromberg	PD12K10	550
Carburetor	Stromberg	PR48-A1	236
Carburetor	Holley	1685-HAR	90
Carburetor	Holley	1375-F	19
Magneto	Scintilla	SF9-LN-2	407
Fuel Pump	Pesco	2P248EB	6
Fuel Strainer	U.A.P.	U635A	76
Governor	Woodward	5a18	10
Prop. Reversing Control	Ham. Standard	72400	20
Oil Separator	Eclipse	564-2A	384
Oil Filter	Purolator	27314	100
Pressure Relief Valve	Aerotec	V301B7	20
Tachometer	Eclipse	2227-11-D3A	11
Vacuum Pump	Eclipse	610-2C	6
Spark Plugs	Aero	LS4-AD1	185,000

AIRCRAFT ENGINES & PARTS

Engine	Wright	R-1820-52	1
Engine	Wright	R-1820-54	16
Engine	Wright	R-1820-60	4
Engine	P & W	R-1830-43	1
Bearing	P & W	1045A	166
Flange	P & W	3506	500
Follower Assy.	P & W	8588	130
Blower Assy.	P & W	3M814	814
Shaft	P & W	48369	53
Shaft	P & W	48363	75
Gear	P & W	48461	390
Gear	P & W	76236	78
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Nose Housing	P & W	84591C	77
Crankcase Assy.	P & W	84350-D	200
Pump Assy.	Wright Aero	420313	33
Drive Assy.	Wright Aero	416421	46
O.E.C. Unit		FM1	36

AIRCRAFT ENGINES & PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
O.E.C. Unit		PY4M(B24)	17
Bearing	Torrington	NR6L12	25790
Bearing	Fafnir	AN200-K3L2	18273

GAUGES

Compass	Eclipse	36001-0	20
Gyro Indicator	Eclipse	14601-1F-B1	11
Gyro Indicator	Eclipse	10078-1AG	62
Position Indicator, Wheel & Flap	Weston	AN5780-2	400
Position Indicator, Wheel & Flap	G.E.	AN5780-2	1000
Position Indicator, Wheel & Flap	Eclipse	20100-11C-4-A1	23
Pitch Trim Gauge	Eclipse	15100-1B-A1	19
Cowl Flap Indicator	G.E.	8DJ99AAY	21
Oil Temp. Indicator	Lewis	77C3	23
Oil Temp. Indicator	Lewis	77C4	13
Oil Temp Indicator	Weston	828TY13Z2	71
Manifold Pressure Gauge	Manning, Maxwell & Moore	AN5770-2	28
Manifold Pressure Gauge	U.S. Gauge (Metric)	AW2-3/4-25K	146
Fuel Quantity Gauge	Eclipse	3801-3B	128
Dual Carb. Temp. Gauge	Weston	828TY12Z2	40
Carb. Air Temp.	Lewis	77C3	22
Carb. Air Temp.	Weston	119862	40
Air Temp. Gauge	Weston	727TY70Z2	11
Air Temp. Gauge	Weston	727TY79Z2	85
Air Temp. Gauge	Weston	727TY73Z2	88
Air Temp. Gauge	Weston	727TY74Z2	83
Air Temp. Gauge	Weston	728-40Z2	10
Air Temp. Gauge	Weston	727-TY37P	298
Air Temp. Gauge	Lewis	47B22	33
Air Temp. Gauge	Lewis	47B23	28
Air Temp. Gauge	Lewis	47B24	54
Air Temp. Gauge	Lewis	47B21	30
Cylinder Head Temp.	Lewis	76B19	8
Torque Indicator	Eclipse	20100-42B-14A2	9
Tachometer Indicator	G.E.	8DJ13ABK	6
Tachometer Indicator	Eclipse	2222-1F-2A	200
Magnesyn Pos. Indicator	Eclipse	20000-8A-14	9
Magnesyn Transmitter	Eclipse	20000-43A-13A1	8
Magnesyn Indicator	Eclipse	23000-2A	67
Pressure Transmitter	Eclipse	22101-11-A4	15
Pressure Transmitter	Giannini	47114-D2.0-20	8
Differential Pressure Gauge	Kollsman	906-6-011	22
Differential Pressure Gauge	Kollsman	254BK-6-052	48

AIRCRAFT (RADIO)

Transmitter	Bendix Radio	TA-12B	20
Receiver	Bendix Radio	RA10-DB	35
Amplifier (PB10) W/ED6 Mount	Eclipse	15401-1	10
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Radio Noise Filter	G.E.	1C-200	740
Radio Noise Filter	G.E.	NF10084	959
Tube		JAN6AL5	327
Standing Wave Ind.	Hewlett Packard	415A	3
Antenna Switch	Bendix Radio	MS49A	26
Control	Bendix Radio	3616	81
Station Box	Bendix Radio	3620	23
Insulator	Bendix Radio	MT48C	518

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Transformer	Eclipse	DW33	11
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Transformer	Eclipse	DW47	33
Transformer	G.E.	70G3	26
Servo Motor	Transicoil	#1300-20	57
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Motor	G.E.	5DP65-MB1	189
Motor	G.E.	5BA25D-J4B	44
Motor	Airesearch	26675	25
Motor	Diehl	FD65-5	21
Circuit Breaker	Spencer	PM-5	2094

ELECTRICAL PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
Circuit Breaker	Spencer	C6363-1-5A	115
Circuit Breaker	Spencer	C6363-1-2A	115
Circuit Breaker	Heinemann	AM1614-80	1700
Circuit Breaker	Cutler Hammer	6141-H69A	237
Amplidyne	G.E.	5AM31JJ9A	31
Amplidyne	G.E.	5AM31NJ10	111
Switch	Kidde	A-4614	151
Ignition Switch	Scintilla	AN3913-1	70
Ignition Switch	Nesco	A-9(94-3926)	250
Master Switch	Jos Pollack	M862A	66
Thermo Switch	Fenwall	17322-2	196
Heater Control Switch	White-Rodgers	1033-4E1	281
Air Ram Switch	Minn. Honeywell	PG208AS1	148
Air Ram Switch	Minn. Honeywell	PG208AS7	40
Pressure Switch	Aerotec	M-101-B	20
Pressure Switch	Eclipse	3135-11C	88
Impact Switch	Kidde	SA/3A	18
Switch	C.H.	8909-K99	2800
Dome Light	Grimes	AN3096-4	2585
Dome Light	Grimes	AN3096-5	775
Dome Light	Grimes	AN3096-6	1365
Plug	Cannon	NAF310310-4B	2747
Plug	Cannon	NAF310310-5B	409
Relay	Leach	7964-404	47
Relay	Leach	7910	24
Relay	Allied	BOBX-2	31
Relay	Square D	B2A	718
Relay	G.E.	CR2791-G100-K4	281
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Relay	Guardian	G34464	41
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Relay	C. P. Clare	D2060	45
Control Box	Vapor Car Heating Co.	98048	34
Compensator	Vapor Car Heating Co.	468311	25
Solenoid	Interstate Aircraft & Eng. Co.	A812	202
Flex. Cable	Airesearch	25432	66
Temp. Control	Fulton Syphon	715E	59
Noise Filter	Mallory	NF3-5	500
Regulator	G.E.	3GBD1A18A	13

VALVES

Valve	Kidde	989585	326
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Valve (3000 PSI)	Parker	2-1046-76	47
Restrictor Valve	Parker	SP4-2746-77	68
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Cone Check Valve	Parker	PL2-2546-75	127
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COCKPIT VIEWPOINT

By Capt. R. C. Robson

It has become the custom in this space to present for the Christmas season something to suit the occasion—or at least something happy and on the lighter side. One year it was a Christmas poem, another a letter to Santa.

So once again let us leave the problems, the philosophies and the rest, and step to another world and speak of lighter things.

Herewith for your pleasure is an item that has been in the files several years—although I have not seen it printed elsewhere. What in the world I can find for Chapter 2 I'm sure I don't know, but since I have a whole year to worry about that, may I now present Chapter 1 of:

Tales of the Aviation Nights

On one of my journeys many years ago I came, quite by chance, upon a fair damsel who related to me this curious tale about a far off and mysterious land. It concerns a traveler, an emperor and three royal wishes.

Our story begins one night before the home of a prosperous traveler where a royal courier from the palace of the emperor appeared.

Upon reaching the door the courier knocked loudly and called out, **"Tis a message from the Emperor, sire."**

Whereupon the traveler made haste to open the door crying out, **"Enter, and deliver your message."**

When the courier had entered and bowed, as was the custom, he commenced to speak: "Sire, 'tis known at the palace that you are shortly embarking upon a journey into far off lands. His Majesty, King of Kings, hereby commissions you to perform three deeds on his behalf. When they have been accomplished you will straightway present yourself at the palace and receive the royal blessing."

Now the traveler, though a man of some standing, was greatly taken back by this honor and spoke, saying, ""Tis a great honor indeed to serve the Emperor, The Lion of Judah, in any way. Pray, what are his desires?"

►**The Three Deeds**—And the courier continued, "As you know, our Emperor, The Chosen of God, is desirous of a knowledge of happenings in other lands, especially in that great land to the west, the United States of America. He therefore instructs you to acquire three motion pictures: The first to be of the United Nations in session; the second to be that dwelling of Presidents, the White House, and the third, a film of that marvelous airplane, the new Boeing Stratocruiser."

At this the traveler made haste to say that it would be done and the messenger departed.

Now, lest the reader remark as to the veracity of this tale, I also make haste to mention that it is indeed fact—if somewhat embellished.

His Royal Highness, King of Kings, The Lion of Judah, Defender of the Christian Faith, Haile Selassie, Emperor of the Ancient Kingdom of Ethiopia, the Chosen of God, did request these three things from an employe of the Ethiopian Air Lines who was on his way to the United States.

The royal command can be read in a letter on file with the Boeing Airplane Company.

And so endeth a tale of the Aviation Nights.

The only other thing left to do is to wish everyone a very Happy Christmas and a prosperous New Year.

(Editor's note: AVIATION WEEK gives Capt. Robson an opportunity to express himself freely in this column. Comments from readers on his opinions are welcome.)

AVIATION CALENDAR

Jan. 8-11—Florida Air Pilots Assn., 11th annual air cruise, Miami, Fla.

Jan. 10-12—Institute of Surplus Dealers, trade show and convention, Madison Square Garden, New York.

Jan. 12-18—Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Statler Hotels, Detroit.

Jan. 18-22—American Institute of Electrical Engineers, winter meeting, Hotel Statler, New York.

Jan. 20-22—Operations Research in Production and Inventory Control, Case Institute of Technology, Cleveland. Speakers include Paul Stillson of Lockheed Aircraft Corp.

Jan. 25-28—Plant Maintenance & Engineering Show, International Amphitheater, Chicago. Conference will be held concurrently at the Hotel Conrad Hilton.

Jan. 25-29—Institute of the Aeronautical Sciences, 22nd annual meeting, Hotel Astor, New York. Honors Night Dinner, Jan. 25.

Feb. 3-5—Society of Plastics Industry, ninth annual division conference on reinforced plastics, Edgewater Beach Hotel, Chicago.

Feb. 4—Instrument Society of America, ninth annual regional conference, Hotel Statler, New York. Aviation section's papers will include: Afterburner Thrust Measurement in Flight.

Feb. 4-6—Institute of Radio Engineers, sixth Southwestern Conference and Electronics Show, Hotel Tulsa, Tulsa, Okla.

Feb. 18-19—Institute of Radio Engineers and American Institute of Electrical Engineers, transistor circuits conference, Philadelphia.

Feb. 21-23—Third annual Texas Agricultural Aviation Conference, Texas A&M College, College Station, Tex.

Mar. 22-25—Institute of Radio Engineers, national convention, Waldorf Astoria Hotel and Kingsbridge Armory, New York.

Apr. 5-6—Society of the Plastics Industry (Canada), Inc., 12th annual conference, Mount Royal Hotel, Montreal.

Apr. 22-23—American Institute of Electrical Engineers, conference on feedback control, Claridge Hotel, Atlantic City, N. J.

Apr. 29-30—American Society of Tool Engineers, 10th biennial industrial exposition, Convention Center, Philadelphia.

May 4-6—1954 Electronic Components Symposium, Department of Interior auditorium, Washington, D. C.

May 5-7—Third International Aviation Trade Show, managed by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 5-7—American Society of Training Directors, 10th annual conference, Schroeder Hotel, Milwaukee.

May 7-8—Inter-Collegiate Flying Assn., national convention and air meet, University of Illinois, Champaign-Urbana, Ill.

May 12-14—Engineering Institute of Canada, annual meeting, Quebec.

May 16-19—American Association of Airport Executives, 1954 national convention, Louisville, Ky.

May 17-20—Basic Materials Exposition and Conference, International Amphitheater, Chicago.

May 31-June 11—Canadian International Trade Fair, International Air Show, and Aviation Day, Toronto.

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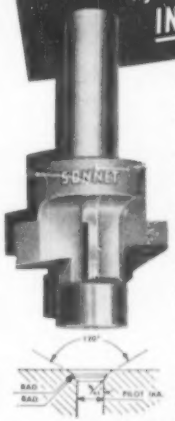

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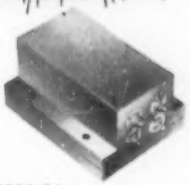

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EDITORIAL

Military Plans & Air Power

It will be difficult for any but extreme disciples of air to take issue with the Administration's official views expressed last week by the chairman of the Joint Chiefs of Staff on the role of air power in revised military planning for the next few years.

There will be healthy debates on Capitol Hill, assuredly, protestations about paper cuts from 143 wings to something like 137, and bitter cries from those with narrow partisan interest and objectives, but the address by Adm. Arthur W. Radford on Dec. 14 will stand as poor evidence to back any claims that the Eisenhower Administration or the Navy-bred chairman of the Joint Chiefs does not believe in air power.

And air power, Adm. Radford took pains to explain, includes the Air Force, Naval Aviation, Marine Corps aviation, Army aviation, "and the tremendous aircraft industry and civil air transportation systems."

Perhaps with Russia in mind, he said:

"You may not fully comprehend the true magnitude of today's United States national air power, but I will state unequivocally that it is superior to that of any other nation."

He said this country "has so developed certain segments of its air power as to achieve a strategic Air Force and a Naval carrier striking force which are without peer in this world. The President of the United States, the Secretary of Defense, and the Joint Chiefs of Staff are of one mind on that matter: This nation will maintain a national air power superior to that of any other nation in the world."

In a previous address, reported in AVIATION WEEK Dec. 14 (p. 20), Adm. Radford had commented on interim plans only, for fiscal 1955—beginning July 1, 1954. Last week he addressed himself to "the long pull—not a year of crisis," over an extended period of uneasy peace, rather than peaking forces at greater costs for a particular period of tension. His address covers the period to June 30, 1957.

Adm. Radford noted President Eisenhower last April had promised that henceforth planning would proceed on the basis of preparations for the long-term pull. "Economically sound military and mobilization plans for this nation and for our allies should result."

The aircraft industry for years has pleaded with Congress and the armed services for a well-planned air defense program over an extended period of years to eliminate the costly and inefficient stop-and-go production of combat and support planes.

The address went another step toward answering questions that some air power advocates have been asking about Adm. Radford ever since he had been appointed to his present post. He was one of the Navy's principals in the bitter public fight with the Air Force over the B-36. Recent reports in aviation circles have indicated that Adm. Radford and the Air Force's Chief of Staff, Gen. Nathan Twining, have worked harmoniously and in full cooperation since Radford's appointment.

In his speech, Adm. Radford said today's emphasis in military planning "is actually pointed toward the creation, the maintenance, and the exploitation of modern air power." He added:

"Today there is no argument among military planners as to the importance of air power. Offensively, defensively, and in support of other forces, it is a primary requirement. Its strength continues to grow, both through increases in combat air units, and through better equipment."

The air power extremists (for whom we hold no brief), will set up a clamor over Radford's statement that other forces are required besides air, although we will concede that these other forces need not be as large as formerly, and there is a trend already under way toward reducing them.

". . . Now, and for an indeterminate period in the future, under most circumstances, air forces must be complemented with other forces," Radford said. "Land forces, amphibious forces, anti-submarine warfare forces, and other well-rounded forces are necessary." These will vary under differing conditions. This complementing of air power with other forces is Radford's concept of "balanced forces," not, he made clear, "an artificial one-third, one-third, one-third, either in manpower or dollars."

This latter definition—one for me, one for you, one for him—which held favor in the Forrestal era, and from time to time until recently—aroused the righteous wrath of even the moderate advocates of air power. It is considered significant that Radford and the Administration finally and definitely have thrown over this artificial and discredited stopgap of the Truman Administration, devised mainly to create harmony among Air, Navy, and Army, rather than to build up our national defense.

Feeders—Use or Lose

Fortunately, two members of Civil Aeronautics Board have dispatched blunt warnings recently that the public must patronize local airlines in their communities if they expect such service to continue.

Joseph P. Adams has received requests for more than 750 copies of an address he delivered to the National Association of State Aviation Officials, outlining a program to arouse citizens along feeder routes to a sense of responsibility for keeping the local lines operating and reducing the government subsidy.

Vice chairman Harmar Denny told the air power symposium at Dallas that the Board does not intend to continue subsidizing indefinitely local services "which are not sufficiently utilized, patronized or appreciated."

None of the 14 local carriers has been able to generate enough traffic yet to be able to carry their mail load on a straight service charge, Mr. Denny noted, and added that the mandate of the people given the Eisenhower Administration is a mandate of economy.

These are wise words from both men. Anything less than maximum public use of these hard-pressed lines is a reflection of stagnation and lack of progress in any community.

—Robert H. Wood

BLIND FLYING...

another Sperry first... 1929

1929 In covered cockpit of his NY-2, Lieutenant "Jimmy" Doolittle, using Gyro-Horizon and Directional Gyro makes first "blind" flight including take-off and landing. Lieutenant Ben Kelsey acts as check pilot.

"Blind" flying has an interesting history. For years many people had flown "blind" on occasion through clouds. And in 1926, William C. Ocker proved man's physiological inability to fly "blind" without instruments. His experiments, based on the Sperry-developed Turn and Bank Indicator, helped pilots understand and use flight instruments. The era of dependable all-weather flying did not begin, however, until Lieutenant "Jimmy" Doolittle made his historic "blind" flight in 1929. With the aid of two new Sperry instruments—an artificial horizon and a gyroscopic directional indicator—he led the way to dependable all-weather flying.

TODAY, AS THEN, SPERRY LEADS THE WAY

Twenty-four years have passed since the Doolittle flight. In those years Sperry has pioneered in development after development, utilizing electronics to make earlier instruments more precise, and to provide still greater mastery of the elements. With the Sperry Zero Reader* Flight Director, for example, military pilots now manually fly and navigate at supersonic speeds with accuracy and precision approaching that of automatic flight—and, with Sperry armament can intercept and destroy enemy aircraft unseen by human eyes.

*T. M. REG. U. S. PAT. OFF.

1932 Captain A. F. Hegenberger in Douglas BT-2A makes first solo "blind" flight and landing at Wright Field, with Sperry Gyro-Horizon and Directional Gyro.

1936 Air Corps Major Ira Eaker, left, makes first transcontinental "blind" flight—and alone—in BT-2A, equipped with Sperry Gyro-Horizon and Directional Gyro. Major William E. Kepner pilots escort plane.

1941-45 Sperry flight instruments enable U. S. Navy and Marine fliers to operate from carriers, day or night. Airborne radar helps pilots locate enemy aircraft and submarines.

1953 The Sperry Zero Reader Flight Director in conjunction with radar aids interception at high altitudes, day or night.

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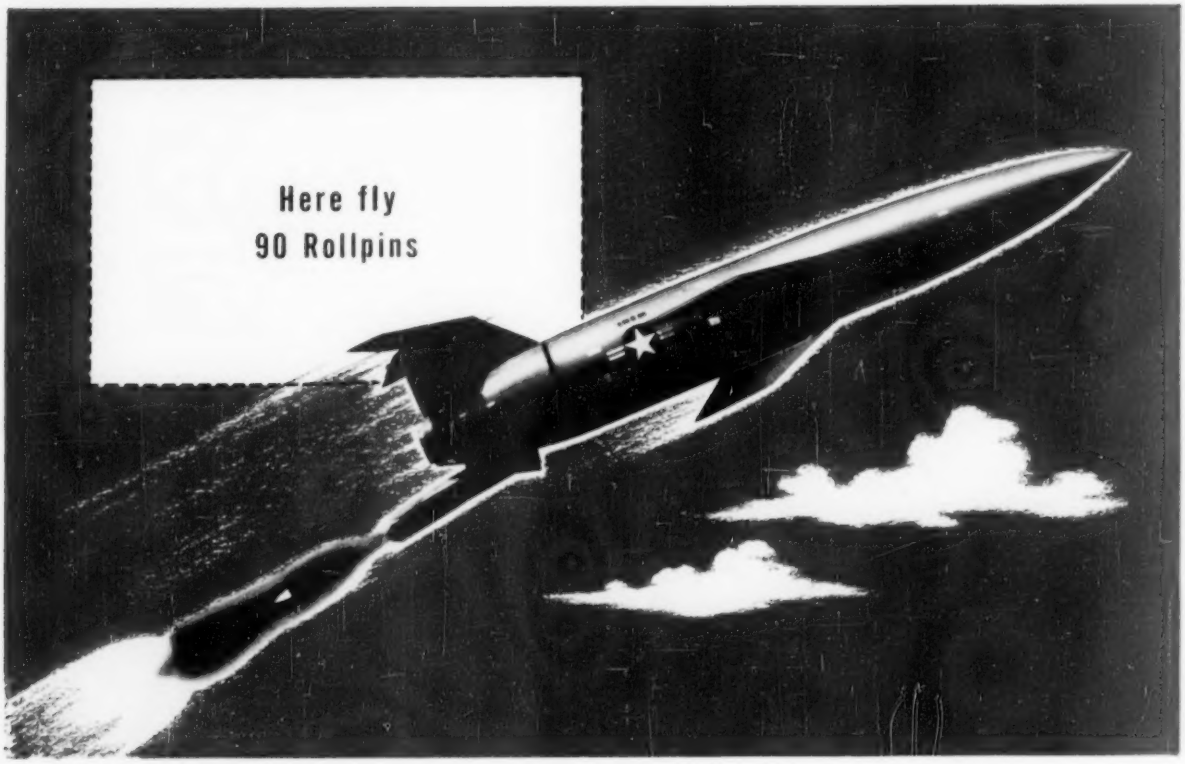
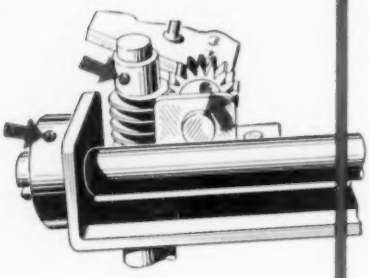
50TH ANNIVERSARY OF POWERED FLIGHT

One of a series of advertisements commemorating the Fiftieth Anniversary of Powered Flight.





A typical application, not included in the pilotless bomber above. Rollpin is driven into standard holes, compressing as driven. No taper reaming is required. Rollpin fits flush . . . is vibration-proof.

ROLLPINS saved The Glenn L. Martin Co. $6,300

The Glenn L. Martin Company cut fastening costs on a single missiles contract by $6,300, as compared to dowel pins . . . by $11,700 as compared to taper pins! These installed cost savings, recently announced to Company engineers, were made possible by the use of just 90 Rollpins per unit.

ESNA Rollpin is the slotted tubular steel pin with chamfered ends. It is simply driven into standard holes, compressing as driven. The Rollpin's spring action locks it in place—regardless of impact loading, stress reversals or severe vibration—that's why Martin was able to make these savings on this contract for pilotless bombers.

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2330 Vauxhall Road, Union, New Jersey

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